

**EFFECTS OF FOODS AND NUTRITION PRACTICAL
INSTRUCTIONAL METHOD ON FOOD HANDLING PRACTICES
IN SECONDARY SCHOOLS IN BENIN METROPOLIS, NIGERIA**

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SEPTEMBER, 2021

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SEPTEMBER, 2021

CERTIFICATION

We, the undersigned, certify that this work was carried out by Gloria Ifeyinwa BARDI, with Matriculation No. PG/EDU1312729 in the Department of Vocational and Technical Education, University of Benin, Benin City.

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DEDICATION

This project is dedicated to the Almighty God, giver of life, for His endless love, care and protection needed to successfully complete this programme.

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TABLE OF CONTENTS

	PAGE
TITLE	i
CERTIFICATION	ii
DEDICATION	iii
ACKNOWLEDGEMENTS	iv
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF APPENDICES	xi
ABSTRACT	xii
CHAPTER ONE: INTRODUCTION	
Background to the Study	1
Statement of the Problem	7
Research Questions	7
Hypotheses	8
Purpose of the Study	9
Significance of the Study	10
Scope and Delimitation of the Study	10
Definition of terms	11
CHAPTER TWO: REVIEW OF RELATED LITERATURE	
Theoretical Framework	12
Concept of Home Economics	16

Concept of Foods and Nutrition	18
Foods and Nutrition Practicals in Secondary Schools	21

	PAGE
Food Hygiene and Food Handling Practices	22
Importance of Hygiene:Hygiene is a very crucial point in food handling practices	25
Facilities in Foods and Nutrition Practicals in Secondary Schools	38
Gender and Foods and Nutrition Practicals in Secondary Schools	39
Instructional Methods for Teaching Foods and Nutrition Practicals	43
Attitude of Secondary School Students towards Foods and Nutrition Practicals	62
Review of Related Empirical Studies	64
Summary of Reviewed Literature	76

CHAPTER THREE: METHODOLOGY

Design of the Study	78
Population of the Study	79
Sample and Sampling Technique	80
Research Instrument	81
Validity of the Instrument	81
Reliability of the Instrument	82
Treatment Procedure	82
Control of Extraneous Variables	83
Method of Data Collection	85
Method of Data Analysis	85

	PAGE
CHAPTER FOUR: PRESENTATION OF RESULT AND DISCUSSION OF FINDINGS	
Presentation of Results	86
Discussion of Findings	94
CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS	
Summary	99
Conclusion	100
Recommendations	101
Contributions to Knowledge	102
Suggestions for Further Studies	102
REFERENCES	103
APPENDICES	115

LIST OF TABLES

	PAGE
Table 1: Population distribution of students offering Foods and Nutrition in 2019/20 academic session	80
Table 2: Sample Size of the Study	81
Table 3: Number of Students with Knowledge of Hygiene on Food Handling Practices	86
Table 4: Number of Male and Female Students with Knowledge of Hygiene in Food Handling Practices	87
Table 5: Paired Sample t-test of Experimental Group in Food Handling Practices	88
Table 6: t-test of independent samples on Students Food Handling Practices at Pre-Test	89
Table 7: Mean and Standard Deviation of Students Food Handling Practices Treatment at Post-Test.	90
Table 8: One way ANCOVA of Students' Food Handling Practices at post-test	90
Table 9: t-test Of Independent Sample on Students' Food Handling Practices at Post-Test by Sex	92
Table 10: Mean and Standard Deviation of Treatment by sex on Students Scores in Food Handling Practices at Post-Test	93
Table 11: Two-way ANCOVA of Treatment by Sex Interaction Effect on Students Food Handling Practices	94

LIST OF FIGURES

	PAGE
Figure 1: Scope of Home Economics – Areas Covered by Home Economics	18

LIST OF APPENDICES

	PAGE
Appendix 1: List of secondary schools and number of students offering F&N in Oredo and Egor LGA	115
Appendix 2: Letter of Identification	116
Appendix 3: Modified NABTEB marking scheme checklist	117
Appendix 4: Rating scale assessment sheet	120
Appendix 5: WAEC practical questions	121
Appendix 6: Scheme of work for both experimental and control groups	126
Appendix 7: Lesson Plan for Conventional Method (Control Group) Lesson Weeks 1 -- 4	127
Appendix 8: Lesson Plan for Practical Demonstration Instructional Method (Experimental Group) Lesson Weeks 1—4	130
Appendix 9: Test of Reliability	133
Appendix 10: Data collection for pre and post- tests	136
Appendix 11: Statistical Analysis (Results)	139
Appendix 12: Minimum Internal Temperature and Rest Time	142
Appendix 13: Photos of lesson classes.	145

ABSTRACT

The study investigated the effect of Foods and Nutrition Practical Demonstration Instructional Method on handling practices in Secondary Schools in Benin Metropolis. Six (6) research questions were raised to guide the study, and four (4) hypotheses were formulated and tested at 0.05 alpha level of significance. The design for the study was quasi-experimental, non-randomized research design. The population was 115 SS II Foods and Nutrition Students in 8 mixed Secondary Schools in Benin Metropolis in Edo State, Nigeria. The sample drawn from the population was 48 SS II Foods and Nutrition Students from Secondary Schools in Egor and Oredo Local Government Area in Edo State.

The instrument for data collection were a standardized West African Examination Certificate (WAEC) past question for knowledge test and an adapted WAEC and National Business and Technical Examination Board (NABTEB) Check list. The adapted checklist was validated and reliability determined using Cronbach alpha statistics and the co-efficient was 0.79 before it was used. Research question 1 and 2 were answered using frequencies and percentages while before hypotheses were analysed using mean, standard deviation, paired sample t-test, t-test of independent samples and two-way Analysis of covariance (ANCOVA). All hypotheses were tested at 0.05 alpha level of significance.

The results from the findings of the study revealed that: (i) the Practical Demonstration Instructional Method was effective after exposing students to the treatment, (ii) there was interaction effect of treatment based on gender; (iii) students have poor knowledge of hygiene practices in food handling; (iv) female students are more knowledgeable in handling practices than the male students. It was concluded that the treatment was effective on the experimental group irrespective of gender. The researcher recommended among others, that Foods and Nutrition Practicals Demonstration Instructional Method guarantees effective teaching of Foods and Nutrition and so should be encouraged in Public Secondary Schools for teaching Food and Nutrition Practicals. There should be provision of facilities for teaching Food and Nutrition Practicals in schools and that Food and Nutrition should be encouraged in boys' schools.

CHAPTER ONE

INTRODUCTION

Background to the Study

Observed performance of youths and young adults not being able to handle food preparation in schools especially in most public secondary schools, was linked with the method employed by the Foods and Nutrition teachers in these public schools in teaching Foods and Nutrition especially practicals and the environment which the students were exposed to. It is necessary for the youths and young adults to the role food play in our body and how to handle during meal preparation in order to maintain life and ameliorate problems of food handling practices.

Food is a universal necessity which helps to keep humans in good condition to maintain healthy living and survival. Food could be liquid or solid edibles that provide nourishment

and promote growth to the individual. Food could also be regarded as any substance liquid, solid or gaseous state, which when ingested, provides the necessary raw materials for the structure and function of the body, enabling and helping the system to function effectively. Foods are classified into nutrients according to their functions in the body. These include proteins, carbohydrates, fats and oil, vitamins, mineral elements, cellulose/fiber and water. No single food item contains all the nutrients in amounts sufficient to maintain life and promote optimal growth. Man must consume a variety of foods in order to have all the nutrients needed by the body.

Nutrition is the study of the nutrient components in foods and in the body. It is also the study of human behaviour in relation to foods. Medically, nutrition is the scientific process by which the body takes in food and obtains nourishment for the cells, tissues, organs, and systems. It is a process by which an individual ingests, absorb, transports utilizes food substances and excretes food waste (Okoe, 2012). The knowledge of nutrition has led nutritionists to understand the value and importance of the nutrients in nutritious and balanced diets. Good hygienic measures must be taken to save the nutrients from unhealthy condition and disease causing agents (micro-organisms) during preparation and cooking. When foods are contaminated by microbes, they may be transferred to already preserved food by dirty hands, cooking tools like chopping boards and clothes which could results in food poisoning. Food can be a source of poison and food nutrients may also be lost by effect of excessive heat or water depending on the way they are handled and treated. Poor treatment of food can destroy the nutrients and when this happens the nutrients become depleted. Example is leaving fruits and vegetables in water for a long time or when vegetables are over cooked (heated).

Foods and Nutrition is a major part of Home Economics that addresses issues involving diet related concepts, health, food choices, meal planning, preparation and serving. Foods and Nutrition curricula emphasize much of practicals to enhance students' active participation in class, to be able to maintain hygiene and handling practices including skill development among others. Students in Senior Secondary Schools, are expected to be guided in practical activities involving best food handling practices by Foods and Nutrition (F&N) teachers since they are future food handlers. They need the abilities and skills to prepare themselves for the future especially those who want to develop a career in Foods and Nutrition. Research has showed that Foods and Nutrition students lack some of the basic knowledge in food handling. Norazmir in Sanlier (2010) asserted that in food preparation knowledge and practice, that students generally have poor handling qualities however, female students were observed to have higher practices in preparation compared to their male counterparts. In terms of knowledge of handling practices, male and female students are at the same level. This may be due to lack of interest on the part of the male students because they were not exposed early enough to handling equipment during practicals. It may also be due to insufficient tools and equipment that may not go round the students or may not be in good state. Thus, the teacher may decide to teach the student by mere explanation (lecture method). Some of the male students may feel that they are wasting their time, and that Foods and Nutrition is perceived as mainly for girls so they try to stay away and leave the work for the girls.

Practical classes in Foods and Nutrition are designed to enhance active students' participation in making food choices, planning, preparation, cooking and serving of nutritious diets including proper food preservation and storage. The importance of practical work is to ensure that students are not only mentally active, but by active participation such that there is an increase students' understanding and motivation to learn (Millar, 2004). Another purpose

of practicals is to develop the students' skills in handling practices (both male and female students), and this will make them to be strong and give them opportunities of creating new recipes. These purposes may be hindered by inadequate working materials, equipment and tools and non availability of laboratories where practicals could be held, instead, classrooms may be converted for use. The non availability of materials and inadequacies of cooking tools and equipment can make the subject uninteresting or unattractive to students thereby posing challenges to Foods and Nutrition students.

The teaching of Foods and Nutrition practicals does not require any one particular teaching method, rather a number of teaching methods depending on the topic and instructions given (Mahundi, (2015).The teaching methods used for Foods and Nutrition practicals include lecture, demonstration, group activity, project method, peer demonstration method, field trip, and others. The predominant teaching method employed by teachers of Foods and Nutrition could be the reason why most students especially males seem not to have interest in Foods and Nutrition practical. Foods and Nutrition teachers, most of the time, tend to use a particular conventional teaching method such as the lecture teaching method in teaching Foods and Nutrition practicals. Lecture teaching method may be used most of the time by Foods and Nutrition teachers probably because they feel that it is the most suitable and they may not be familiar with other teaching methods where students learn by doing. This is why they tend to rely mostly on convention (lecture) method. In the lecture method, the teacher discusses and explains the topic to the students and later tell them to go and carry out the practicals on their own. This is very common in public Secondary Schools and most students may have forgotten one or two things the teacher had taught using the lecture method. In the lecture method, the teacher assumes the position of knowing it all in the teaching--learning situation, and provides information which he/she feels that the students do

not have. The teacher directs (instead of showing and demonstrating to the students step by step with the available tools) while the students are left on their own to do the practicals either with the tools they brought from home or the few manageable ones in the school laboratory. Eyiuche, (2013) in Gatawa, (1990) asserted that the conventional teaching method seems to be the most commonly used in Secondary Schools in Nigeria, and this method of teaching does not guide the development of the students' psycho-motor skills efficiently.

Some merits of the lecture methods include: allowing the students to listen and jot down what is being taught; promoting useful discussion; and could be effective in handling large classes (Osuyi, and Anietor 2018). The major disadvantage is that, it is teacher centered since the students hardly have enough facilities to practice with, therefore, lecture method may not be effective. Other disadvantages may be that lecture method encourages laziness, rote memorization and could kill the interest and attitude of the students in the subject matter, thereby making the students' level of thinking to be shallow, cramming of facts, poor retention and teacher depending on the teacher for stimulation of knowledge. Adeola (2014) asserted that teacher centered method of teaching encourages cramming of facts which are easily forgotten and thus results in students not enjoying the lessons and discourages intellectual stimulation and discovery. Lecture method will give room for the students to take part in food handling practice, thus the use of Practical Instructional Method (PIM) becomes imperative.

Practical Instructional Method, which is an activity based, puts everyone to work and it is student/teacher centered. The Practical Instructional Method (PIM) is a teaching learning situation where the students observe and manipulate tools and equipment as they watch the teacher's demonstration. The students acquire knowledge practically by doing (El-Rabadi, 2013). All that the students do is to imitate their teacher by moving their hands,

equipment and tools the way the teacher teaches and demonstrates until they learn to become perfect and independent. Practical Instructional Method gives room for students' participation in practicals thereby improving the students handling practices and skill development. Adebisi, Babayeju and Gbadebo (2016) asserted that it is very important to expose students to food practicals for skill acquisition. This method gives room for the students to practice more especially what they see and do in their classes. Practical Instructional Method can activate the interest of the male students in taking part in Foods and Nutrition academic classes.

Foods and Nutrition which used to be perceived a female biased has seen the entrance of males offering the course at post Senior Secondary levels of education. According to Lee (2001), gender is an ascribed attribute that socially and biologically differentiate the females from the male folks. It connotes male (boy) or female (girl). Culturally, girls are supposed to have better food handling practices than the males because of their traditional roles in the kitchen (helping their mothers in meal preparations and cleaning up), yet it is not clear if all of them handle foods and tools properly. Although most males may not have enough good food handling practices, but current trends seem to suggest that they practice well in catering businesses today as they try to compete with females. They all try to improve on their food handling practices.

Food handling practices are ways to maintain hygiene when handling food items, surfaces, tools and equipment and to manipulate these tools and equipment for proper skill development. Food handling practices occur from the point of food purchase through cooking, serving and preserving (Uko-Aviomoh and Nwabah, 2009). This will help the handlers to use good quality foodstuffs for better meal preparation. It is also the food handlers' duty to use clean water, good preservation and best cooking methods in order to retain the food nutrients, and ability of the nutrient to be absorbed properly by the body. The Foods and Nutrition

students should therefore be exposed to meal planning and its importance, budgeting and purchasing, preservation and storage, methods of cooking before embarking on practicals proper, so that they will have broader view of food handling practices during meal preparation.

The teaching of Foods and Nutrition practical to students is for active participation, producing good quality product using their hand to manipulate instruments and the development of skills in food handling practices which the Secondary School Students need to possess. The conventional method of teaching Foods and Nutrition practical seem not effective. Therefore, this study tried to address the issue by applying another teaching method.

Statement of the Problem

Foods and nutrition curriculum at the Senior Secondary School level emphasizes practicals to enhance students' active participation in class, and acquisition of skill, good hygiene development and food handling practices among others (Mahundi, 2015 & Norazmir, 2012). The students are expected to be guided actively through basic instructions by their teachers using the different and suitable teaching methods to make them active participants in practical class, but most of the students as observed by the researcher were found to be lacking behind especially in handling and usage of tools and equipment. The causes of this problem hinged on inadequate materials to work with such as tools, equipment, no laboratory where practical would be done. Therefore the major problem of this study was found to be the predominant use of the conventional method of teaching in teaching Foods and Nutrition practicals in Secondary Schools. This problem if not solved, may lead to a continuous poor enrolment of students in WASSEC and NECO examinations, most students may prefer to

offer other subjects rather than Foods and Nutrition. Literature revealed that some researchers tried to solve the problem by mere teacher demonstration method without involving the students participation.

This triggered the researcher therefore, to investigate the effects of Foods and Nutrition Practical Instructional Method on food handling practices in Senior Secondary Schools in Benin Metropolis, Edo State, Nigeria.

Research Questions

The following research questions were raised to guide the study:

1. What is the level of hygiene knowledge on food handling practices of students before Foods and Nutrition Practical Instructional Method?
2. What is the level of hygiene knowledge on food handling practices of male and female students?
3. What is the difference between the pre-test and post-test mean scores of students' taught food handling practices with Foods and Nutrition Practical Instructional Method?
4. What differences occurred between the post-test mean scores of the group taught with Practical Instructional Method (experimental group) and those taught with Conventional Method (control group) on food handling practices?
5. What is the difference between the post-test mean scores of students taught food handling practices with Practical Instructional Method (experimental group)?
6. What is the interaction effect of Practical Instructional Method and gender on students' food handling practices?

Hypotheses

Research Questions 3, 4, 5 and 6 were tested at 0.05 level of significance as hypotheses 1, 2, 3 and 4.

1. There is no significant difference between the pre-test and post-test mean scores of students taught food handling practices with Practical Instructional Method and those taught with conventional method.
2. There is no significant difference between the post-test mean scores of those taught with Practical Instructional Method and those taught conventional method (experimental and control groups) on food handling practices.
3. There is no significant difference between the post-test mean scores of male and female students in the experimental group on food handling practices.
4. There is no significant interaction effect between treatment method and male and female students' food handling practices.

Purpose of the Study

The main purpose of the study was to investigate the effects of Foods and Nutrition Practical Instructional Method on students' food handling practices in Senior Secondary Schools in Benin Metropolis, Edo State, Nigeria. Specifically, the study investigated:

- If the students' level of hygiene knowledge on food handling practices was low, moderate or high for the experimental and control groups before the treatment (Foods and Nutrition Practical Instructional Method) was administered,
- The level of knowledge of hygiene on food handling practices among male and female students in the two groups (the experimental and control groups),

- whether there is a difference in the pre-test and post-test mean scores on students' food handling practices before and after Foods and Nutrition Practical Instructional Method,
- whether there is a difference in the post-test mean scores of the experimental and control groups on food handling practices.
- whether there is a difference in the post-test mean scores on food handling practices of male and female stud in the experimental group
- the interaction effect of treatment method between males and females on students' food handling practices

Significance of the Study

The study will be of great benefit to nutritionists, Foods and Nutrition teachers and students, caterers, home makers, food vendors, health educators, education planners, and the general public if disseminated through seminars, workshops, conferences, publications, and online channels.

The study would help nutritionists, most especially those who teach Foods and Nutrition in Public Secondary Schools to use Practical Instructional Method which stands more effective than the conventional method of teaching as a pedagogical strategy to teach such topics as hygienic handling of foods in Foods and Nutrition lessons. It will make the teachers to be more competent in their teaching and also stand a better way teach best practice for handling food hygienically to teachers and students.

The study will have a beneficial effect on the food preparation and vending enterprises since most of the Secondary School Student of Foods and Nutrition may eventually seek further studies and careers in food industries.

The study would be of benefit to Foods and Nutrition teacher and health educators in pursuit of proper handling and dispensing of food hygienically in the society. It will also develop and improve literature on the best pedagogical practices for Foods and Nutrition (Home Economics inclusive) in the country. This will help Health Educators and Education Planners to include such literature in Foods and Nutrition Curriculum to be used in Secondary School.

The general public and future researchers would find the literature useful and beneficial to themselves.

Scope and Delimitation of the Study

The scope of the study, covered food handling practices in Senior Secondary Schools using the Practical Demonstration Instructional Method of teaching. The ideal class determined for use was Senior Secondary School II (SSII) Foods and Nutrition as Senior Secondary School I (SS I) is an introductory class and Senior Secondary School III (SS III) was already concluding the session.

The content covered all about food handling practices and manipulative skills of the students in practical classes. The study investigated the effective teaching method for Foods and Nutrition Practicals.

The study was delimited to Egor and Oredo Local Government Areas in Benin Metropolis and two public mixed Senior Secondary Schools were used for the study. This

was because only Egor and Oredo mixed Senior Secondary Schools offer Foods and Nutrition out of the three Local Government Areas in Benin Metropolis which included Ikpoba-Okha. Foods and Nutrition is only offered in some Girls Secondary School and not in mixed secondary School in Ikpoba-Okha

Definition of Terms

Practical: Teaching learning process in a laboratory which involves the use of hands and tools to achieve a desired product.

Demonstration: Step by Step process of teaching someone how to make or prepare meal to a finished product.

Conventional method: A teaching method that has been in use for a long time.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter covered the review of related literature and under the following sub-headings:

- Theoretical Framework
- Concept of Home Economics
- Concept of Foods and Nutrition
- Foods and Nutrition Practicals in Secondary Schools
- Food Hygiene and Food Handling Practices

- Importance of Hygiene: Hygiene is a very crucial point in food handling practices
- Facilities for Foods and Nutrition Practicals in Secondary schools
- Gender and Foods and Nutrition Practicals in Secondary schools
- Instructional Methods for Teaching Foods and Nutrition Practical
- Attitude of Secondary School Students towards Foods and Nutrition Practicals
- Review of Related Empirical Studies
- Summary of Reviewed Literature

Theoretical Framework

The Dave's Psychomotor Domain Taxonomy (PDT) of 1970 was used as the theoretical framework for this study. With growth of formalized vocational education, noticeably in the Organisation for Economic Co-operation and Development (OECD) developed economies in the 1950s to the 1970s, attention turned amongst policy makers as to how to codify and measure progressive skills development. These resulted in the development of a number of educational taxonomies for psychomotor objectives notably those of Simpson (1972), Harrow (1972) and Dave (1969). It is understood that Ravindra Dave was party to Bloom's project team's original 1950s work on the cognitive, affective and psychomotor domains although all three significant contributions have to some extent referenced Bloom's work. Dave (1970) developed five different levels of skills, from the most basic to the most advanced. According to the taxonomy theories, every faculty wants to deliver the best learning for every student and it is good to enhance this with practice (Dave 1970). According to Dave, every discipline requires a tool (s) in pursuit of the goal of the discipline and the degree of increasing proficiency in the deployment of these tool(s) comes from

practice as they progress through their studies. His five levels of “skills” represent different degrees of competence in performing a skill. The five levels, in order from most basic to most advanced, are:

1. **Imitation:** Learner watches actions of another person and imitates them. Copy action of another, observe and replicate, watch teacher or trainer and repeat action process or activity. The major actions at this level are to: copy, follow, replicate, repeat and adhere.
2. **Manipulation:** Learner performs actions by memory or by following directions. Reproduce activity from instruction or memory, carryout task from written or verbal instruction. The major actions at this level are to: recreate, build, perform, execute and implement.
3. **Precision:** Learner’s performance becomes more exact. That is learners execute skill reliably, independent of help; perform a task or activity with expertise and to high quality without assistance or instructions; able to demonstrate an activity to other learners. The major tasks at level are to: demonstrate, complete, show, perfect, calibrate and control.
4. **Articulation:** Learner can perform several skills together in a harmonious manner. The learner is therefore able to adapt and integrate expertise to satisfy a non standard objective, relate and combine associated activities, develop methods to meet varied novel requirement. The major actions at this level are to: construct, solve, combine, coordinate, integrate, adapt, develop, formulate, modify and master.
5. **Naturalization:** Learner achieves a high level of performance, and actions become natural with little or no thought about them. The actions are now more automated, unconscious mastery of activity and related skills at strategic level. The learner is able

to define, aim, approach and use activities to meet strategic need. The major tasks at this level are to: design, specify, manage, invent and project management.

Dave's PDT believes that learning starts from its simplest form (imitation), and progress to a level where the student or learner is able to achieve the highest or accomplish the most complex tasks which is Naturalization. For meaningful learning to take place, learners require to experience and experiment an event by feeling, touching and playing with the objects. This art of experimenting and experiencing is what practical instruction is all about and this is what Dave PDT is all about. The learner progresses from simple imitation/mimicking (copying, replicating, and performing) the ability to display competence in the most complex way (create, design, develop, invent, manage). According to Dave, under imitation, the students/learners watches actions of the teacher or tutor and imitates them. Under this stage which is the first and simplest, the learner/student copy, replicate the actions of the teacher/tutor following observations. At this stage, performance quality is low but this not considered a problem. At the Manipulation stage, the students should be seen to be able to perform a skill on his/her own after taking lessons from the teacher or tutor. With the instructions given, the students should be able to advance in confidence to practice on his/her own. Precision level, involve the students being able to get close to perfection. At this stage, he/she should be performing a skill with a high degree of precision. Working and reworking is the key word to watch out for at this stage. This is performing the task with little or no assistance. Consistency in exactness become the behavioural action at the Articulation stage. The student tries to be internally consistent in the performance of the act. Also, at this stage, attempts are made to combine a series of skills or activities to meet a novel requirement because of level of confidence and consistency in performance.

At the last stage of Dave's PDT, the student should be a master with a great level of performance until it becomes second-nature or natural, without the need to think much about it. This is the Naturalization stage.

Foods and Nutrition is a discipline where with regular experiencing and experimentation with tools and by feeling and touching can cause learner to grow from being a rookie to an expert. According to Adebisi, Babayeju and Gbadebo (2016), indicates that Foods and Nutrition is a practical-oriented subject, taught especially with practice and drill methods of teaching in schools in order to enhance learning among the learners. Therefore, with Dave's taxonomy theory, students can grow from imitation to competence following the steps of Imitation, Manipulation, Precision, Articulation and Naturalization. If Foods and Nutrition students are properly guided on the processes of handling practices through these PDT steps they would not need any other training after school as it is currently observed. Dave's PDT is based on real life experience and experiment will help students to transform knowledge or information into their personal knowledge that they can apply to different situations. Exposure of Foods and Nutrition students to the practice of food handling techniques definitely will enhance the students' expertise in the field after graduation, and this is the philosophy of Dave's taxonomy. In Dave's PDT, the learner (Foods and Nutrition students) examines learning requirements (imitation) and thinks how to solve a problem in hand. The students do not learn about the content rather they learn about the process to solve the problem by creating, designing, developing, or inventing. At stage of Dave's taxonomy, actual learning has taken place.

Concept of Home Economics

Home Economics, also known as family and consumer sciences, is a field of education, which concerns itself with management and economics of the community and

home. Although it was mostly meant for girls and young women in the past, these days, all genders are involved in Home Economics as an academic learning/subject. Other names that are used for this subject are domestic economy, human sciences and home science.

Some researchers have conceptualized Home Economics as the study of human and matter resources affecting homes and families, and the use of these knowledge for the benefit of mankind. The contemporary philosophy of Home Economics is the application of the knowledge from the Pure and Applied Sciences, Social Sciences, Arts and Humanities to develop men and women with fundamental competences in proffering scientific solutions to problems in the use of resources to access and increase information on the facts of life and improve living in the family, the community, nation, and the world at large.

From the definition of the contemporary philosophy of Home Economics it can be observed that Home Economics as a discipline has a broad knowledge base, drawing on Pure Sciences such as Biology; Chemistry; Physics; Mathematics; Applied Sciences such as Nutrition, Information Technology, Engineering of Home Appliances; and Social Sciences including subjects such as Sociology, Family Living, Human Development and Psychology.

The aims of the Home Economics curriculum are to enable students to:

- be responsible citizens and informed consumers willing to contribute to the well-being of individuals, families and society in terms of meeting basic human needs;
- demonstrate good use of management and organizational skills in handling physical and socio-economic resources for self, family, community and society;
- analyse contextual factors contributing to the well-being of individual, family and society with application of knowledge from the food science and technology group or fashion, textiles and clothing group;

- devise and implement strategies to solve complicated problems in technological contexts, in particular, food / fashion, using a range of appropriate techniques and procedures;
- evaluate critically the impact of social, cultural, economic, scientific and technological developments on the well being of individuals, families and society as a whole; and
- further their studies and lifelong learning in food or fashion-related fields

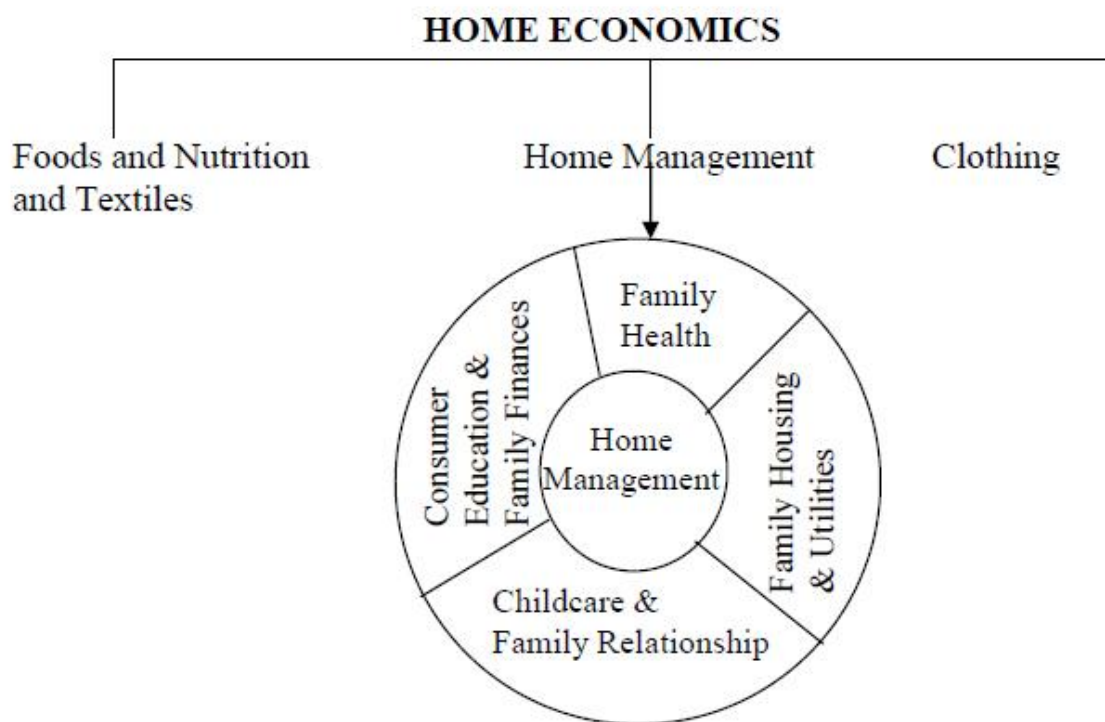


Figure 1: *Scope of Home Economics*

Source: adapted from Anyakaoha and Eluwa (2013)

It is evident that Home Economics is so wide in its scope but already in Scope and delimitation.

Concept of Foods and Nutrition

Nutrition is the process of breaking down food to enable it carry out its various functions or nutrition is the foods we eat and how the body uses it. It is the study of how substances in foods affect our body and health (Ha'ag, 1991). Hence nutrition is seen as food at work in the body. Ihensekihien and Nwabah, (2018) asserted that nutrition is a major, modifiable, and powerful factor in promoting health, preventing and treating diseases and improving quality of life. Food is important because it serves physiological and socio-cultural purposes. They are quite valuable to human body because they provide energy for its various activities, build up the body and protect it from diseases as well. According to Gordon (2003) nutrition as a science is concerned with the study of the right kind of foods for human beings. Healthy and complete nutrition is something much wider than the mere intake of sufficient foods. (Ha'ag,1991) It requires not only a sufficient and properly balanced diet but also a healthy, receptive and responding body. The science of nutrition is important because what a person eats has a direct influence on how he or she grows, learns and adapt to the physical and emotional stresses of living. In the words of Salami (2018), nutrition is the science that primarily deals with food intake (ingestion) digestion, absorption, transportation and utilization necessary for growth and development as well as general maintenance of life and health and the prevention of disease. In other, it is the act or process of nourishing or being nourished, specifically the sum of processes by which an animal or plant take in and utilizes food substances. The study and practice of nutrition involve a spectrum of other basic and applied scientific disciplines (Molecular Biology, Genetics, Biochemistry, Chemistry, Physics, Food Science and Technology, Microbiology, Physiology, Pathology, Psychology, Immunology, Sociology, Political Science, Anthropology, Communication and Economics). Nutrition is primarily centered on food nutrients and its principles to promote health and wellness, to prevent diseases and/or to restore health in individuals, families, communities and the population at large.

Godman and Grutteridge (2011) defined food as any substance which is taken into the body system in order to enable an organism to grow and maintain its health. Food is anything, either solid or liquid, possessing chemical composition which enables the body when swallowed to do one or more functions in the body. Food can also be seen as a combination of the components - carbohydrates, fats and protein - which our body needs for its normal function and to provide energy required by the body for physical activities or exercise. Good food is the basis of good health and well being. Food consumption should provide the body with energy, build and protect the body from diseases. According Udoh, (1999) food regulates body functions and keeps them in good working condition. It provides energy required by the body for physical activities and it supplies materials for general growth. Food plays paramount role in one's life and there is a strong correlation between good food and development (Salami & Uko-Aviomoh, (2004).

Salami (2018) saw food as any substance that can be take in and assimilated to enable humans stay alive and grow. Such must be the carrier of nourishment which must be socially and culturally acceptable. According to her, food contains nutrients of various types and contents which she defined as components of food that are indispensable to the body's functioning. They provide energy, serve as building materials, help maintain or repair body parts and support growth. Some of these nutrients include; water, carbohydrate (yam, rice) fat (vegetable oil, margarine among others) dietary fibre (soluble and insoluble fibre) protein (meat, fish and egg), Vitamin (A, B complex and C), Mineral (Calcium , Phosphorous) and Trace elements (iron, manganese , cobalt) (Salami, 2018).

From the definitions above, it can be shown that Foods and Nutrition is the study of the science of food and how the body utilizes foods. Foods and Nutrition is a practical-

oriented subject which is taught especially with practice and drill methods in schools in order to enhance learning among the learners. (Adebisi, Babayeju. and Gbadebo , 2016).

Foods and Nutrition is one of the three subjects covered under Home Economics. It is a scientific study of foods and their nutrients (foods and their components) in relation to the body that is fed by the food and the health of the individual. Guthrie and Prociano (2007) highlighted the Foods and Nutrition addresses nurturing or nourishment of the body. Foods and Nutrition majorly deals with the studying of nutrients and their relationship with foods and living things. Plaxcedia (2015) described Foods and Nutrition as a subject that addresses issues involving understanding of diet related concepts, health, food choices and food processing as well as meal planning.

Foods and Nutrition Practicals in Secondary Schools

Foods and Nutrition aims to equip students with the knowledge, skills and values that will help them to make appropriate lifestyle choices. Studying Foods and Nutrition equips young people to make healthy choices, shop wisely and become independent members of society.

The skills, knowledge and understanding developed through studying Foods and Nutrition in secondary schools are important in today's society, where:

- Many people rely on ready-made meals;
- Obesity is an increasing problem; and
- Diet - related illness is prevalent.

Students have the opportunity to explore these issues in context, leading them to develop a range of transferable and cross-curricular skills. As schools develop their Foods and Nutrition Curriculum, pupils should have opportunities to learn about:

- Healthy Eating;

- Home and Family Life; and
- Independent Living.

Foods and Nutrition as a practical subject can promote and enhance the well-being of individuals, families and communities through understanding food choice, nutritional health, consumer issues and relationships.

As part of learning for life and work, Foods and Nutrition contributes directly to by helping to develop young people as:

- Individuals
 - by creating opportunities for them to explore their health in practical ways, helping to increase their potential to live a healthy life and to make responsible choices about their diet;
- Contributors to society
 - by giving them a sense of themselves and how they relate to one another as social beings;
 - by making them aware of values and lifestyles that are different from their own and helping them make reasoned judgements in family relationships; and
- contributors to the economy and the environment
 - by providing awareness of themselves as consumers in a changing economy, helping them become discerning and effective when making judgments about issues such as the environment and personal finances. (Black 2007).

According to Foster (2007) Foods and Nutrition is a practical subject to study. Students should take part in practical activities within a given topic. Practical activities allow students to consider their own diet and health. The subject ensures that students learn practical aspects of food preparation, hygiene and food safety. As students practice different methods of food preparation they will develop their ability to select and use methods

appropriate to the recipe and type of food they are preparing. They will also gain practical experience in using familiar and unfamiliar utensils and equipment.

Food Hygiene and Food Handling Practices

Hygiene can be described as an act of cleanliness, a means of healthy living, to be free from germs and diseases. Health consciousness is synonymous with hygiene consciousness (Uko-Aviomoh and Nwabah, 2009). People should also note that some foods are more hospitable to microbial growth than others. So they pose a potential health hazard. Those who prepare food should keep in mind that food borne illness is always possible. Foods that are high in moisture nutrients and those that are chopped and ground are especially favourable hosts (Sizer and Whitney, 2019).

At this point, hygiene and cleanliness is important by the food handlers to avoid contamination and cross contamination of the foods. There are some basics for handling food and in every step of food preparation. It is necessary to follow the four steps of the food safe campaign to keep food Safe and they are:

Clean – Wash hands and surfaces often;

Separate – Do not cross-contaminant;

Cook – cook to the right temperature; and

Chill – Refrigerate promptly.

Clean- Wash hands and surfaces often and should be washed with soap and clean water before and after handling food items when cooking, eating and after using the toilet. Wash and clean utensils, and tools to be used such as plates, knives, spoons, chopping boards, bowls, and other. All the tools and equipment should be kept neat and away from

contaminants like flies and kitchen pests. Effective hand washing has been an essential control measure for prevention of pathogens (Nigusse and Kumie, 2012). This measure should be taught to both male and female Students especially the foods and nutrition Students to avoid food borne diseases such as the deadly EBOLA and LASA FEVER and the most recent CORONA Virus Disease, tagged COVID 19'. Although an air borne disease, COVID 19', can also be transmitted by unlearned hands and surfaces like tables, work tops and others.

Separate – Do not cross-contaminant. Avoid cross contamination of food items before use, so the food items already saved from contamination such as vegetables, cooked foods will not be contaminated with raw foods such as meat, poultry, fresh fish and others. They can be separated neatly by wrapping meat, fish and poultry in cellophane and put in plastic bowls with cover in the freezer to avoid the water from them dripping into other foods. These raw foods (meat, poultry, fresh fish and others) are capable of contaminating other foods. Do not use the same board for cutting poultry, meat or fish for cutting vegetables.

Cook – cook to the right temperature.

Cooking is the thermal heating of foods at sufficient temperature over time to kill micro-organisms in the food. Cook all food to the minimum internal temperature as measures with thermometer before removing from the heat source. For reasons of personal preference, consumers may choose to cook food to higher temperature. (See chart on appendix 18).

Chill – Refrigerate promptly. Fresh foods should be cleaned and chilled in the refrigerator such as vegetables fruits and dairy foods, while frozen foods should be frozen at the right temperature (5°C or below).

It is necessary in handling practices to think about food indicators, and food security in-order to have foods that are almost in perfect conditions, get foods in season, prepare and serve food that are appetizing, attractive with good aroma and nutritious enough to enhance

body development and prevent malnutrition and other food related diseases. Foods should be free from deterioration, contamination by pathogens and chemicals so that they can be in good condition to the consumers. There should be sufficient quantities of appropriate food in the market so that consumers can make better choices for meal preparation. In purchasing, the food handlers should think about foods in season as they are fresh, at their best, most plentiful and cheaper so that there is enough choice to make, buy and preserve, using all methods of food preservation and storage for later use.

Importance of Hygiene: Hygiene is a very crucial point in food handling practices

- It helps to keep out micro-organisms from our foods
- It helps to protect us from illnesses and diseases
- It promotes nutrient intakes and utilization
- It saves cost and time
- It leads to healthy living and longevity

Food hygiene is the conditions and measures necessary to ensure the safety of food from production to consumption. Food can become contaminated at any point during slaughtering or harvesting, processing, storage, distribution, transportation and preparation. Lack of adequate food hygiene can lead to foodborne diseases and death of the consumer. (WHO, 2019). It aims to study methods for the production, preparation, and presentation of food, which is safe, and shelf-stable. It covers the proper handling of every variety of foodstuff and drink, and the equipment and apparatus used in their preparation, service, and consumption (Uko- Aviomoh and Nwabah 2009) .

A food handler is defined as a person in food trade or someone professionally associated with it, such as an inspector, who in his routine work comes into direct contact

with foods in the course of production, processing, packaging or distribution (Zain and Naing 2002). Food handlers play a major role in ensuring food safety throughout the chain of producing, processing, storage, and preparation of foods. Mishandling and disregard for good hygiene measures on their part may result in food contamination and its attendant consequences (Williams, 2001). Food poisoning and other food related diseases like typhoid and cholera could result if food is not properly handled and prepared. Proper food handling and preparation is an important aspect of nutrition and community health that require attention.

According to e-How in Ifeadike, Ironkwe, Adogu, and Nnebue (2018), a food handler is a person with any job that requires him/her to handle unpackaged foods or beverages and be involved in preparing, manufacturing, serving, inspecting, or even packaging of food and beverage items. All food handlers are required to use proper hygiene and sanitation methods when working with foods. Food hygiene is the set of basic principles employed in the systematic control of the environmental conditions during production, packaging, delivery/transportation, storage, processing, preparation, selling and serving of foods in such a manner as to ensure that food is safe to consume and is of good keeping quality (Plaut, 2000). Food handling is one of the important factors in determining the safety of food. However, food itself can pose a health threat due to difficulties in securing optimal hygienic food handling practices. (Okubagzhi 2008 and Beaver, Jung & Cupp 2004) Some of the practices as highlighted by them, are discussed below.

Purchasing and Receiving: All foods served in a food service establishment must come from an approved source. Food service establishments should work with their suppliers to ensure the foods they are using meet the food safety standards. Temperature and time are the two most important factors to control. Food need to be received and stored as soon as

possible. The staff of the food service establishment should be checking for temperatures and conditions of incoming food. All refrigerated foods should be put away quickly to prevent time and temperature abuse. Frozen foods should not have large ice crystals, be discolored or dried-out. Canned goods should have labels, no swelling and flawed seams, rust or dents. Never accept home-canned foods because of the risk of botulism.

Dry Storage of Goods: All canned foods and dry ingredients are stored in a designated area. Foods should not be stored in areas such as restrooms, furnace rooms, stairwells or hallways. Foods should be stored off the floor and in closed containers. Storage areas should be well ventilated and pest free. Dry storage areas can become a food source for rodent and insects. Keeping containers closed, in sound condition and off the floor help to keep the storage area pest free. Stock rotation is a good management practice. Foods and chemicals need to be stored separately. Chemicals should be stored below and away from foods to prevent chemical contamination.

Cold Holding of Foods: Cold holding is storing foods under refrigeration at 5°C or below. Refrigeration prevents food from becoming a hazard by slowing the growth of most microbes. Some organisms like *Listeria monocytogenes* is significantly slowed but not stopped by refrigeration.

Walk-in Refrigerator Temperature: The walk-in refrigerator is the major cold storage area in a food service establishment. The temperature of a walk-in refrigerator must be sufficient to adequately hold the food temperature at 5°C or below. The temperature of a walk-in refrigerator is usually colder than 5°C. To compensate the opening and closing of doors and demands of adding additional foods for storage and cooling. Foods need to be stored to prevent contamination. All cooked foods and foods that will receive no further cooking

should be stored above other foods. Foods need to be stored to allow enough space for air to circulate around them.

Thawing foods: Thawing food may take several hours or days depending on the size of the food item being thawed. Thawing must be done so that the risk of cross-contamination is reduced, and the time that potentially hazardous food is in the temperature danger zone (5°C to 57°C) is kept to minimum.

To thaw foods safely, the following steps should be taken:

- Thaw under refrigeration (5°C and below)
- Under cold running potable water (safe to drink) of 21°C or less as part of the cooking process.
- In a microwave then transferred to conventional cooking equipment with no interruption in the process.

Cooking Temperature: Cooking is the thermal heating of foods at sufficient temperature over time to kill microorganisms in the foods.

The following are the requirements for the different foods:

- Beef, fish, seafoods, eggs – 62.7°C.
- Rare Roast Beef - 54°C.
- Pork – 62.7°C
- Poultry, foods containing poultry, stuffed meats or stuffing containing meat, casseroles, containing potentially hazardous foods – 73.8°C.
- Restructured meat, ground or fabricated meat - 68°C.

Cooking requirements are based on the biology of pathogens. Different species of microorganisms have different susceptibilities to heat.

Foods characteristics also contribute to the lethality of cooking temperatures. Heat penetrates different foods at different rates. High fat content reduces the lethality of heat. High humidity in the cooking container or the moisture content of the foods aid the lethality of heat. To effectively eliminate pathogens, there are a number of factors to consider: the level of pathogens in the raw product and the initial temperature of the foods and the bulk of the foods. Another factor to consider, to kill the pathogenic organisms in foods, cooking must heat all parts of the foods to the required temperatures.

Reheating Foods: Reheating is the thermal process to heat food that have been previously cooked and cooled in a food service establishment. Reheating of food is termed “rechauffe” in nutrition which means re-heated food and it is applied to left-over food from the previous meal (Nwabah, 2011). Every housewife at one time or the other is faced with left-over food and experience, the economical housewife will turn and improve the left-over food in to adequate, palatable dishes to be served with other meals. Care must be taken when re-heating left-over food. Proper reheating can eliminate a major portion of pathogens. Proper reheating is heating a food to 73.8°C within two hours. The more a food is processed, the greater the risks. When food is held, cooled and reheated, there is an increased risk from contamination caused by personnel, equipment, procedures and other factors. When food is cooked and cooled the product goes through the danger zone (optimal temperature range for microorganisms to grow) several times which also increase the risks.

Hot-Holding of Foods: Once a food is heated or cooked, the food must be maintained at a temperature to limit the growth of bacteria. The correct hot holding temperature is 57°C. The potential for growth of pathogenic bacteria increases once a food is reheated than the

potential in raw food. The spoilage organisms that may be present in raw foods inhibit the growth of pathogenic organisms by competition. Once a food is cooked, these spoilage organisms are reduced.

Cooling Foods: Cooling is a process of removing heat from food quickly enough to prevent microbial growth. One method is done by placing food in shallow containers no deeper than 2 inches and leaving them uncovered until cold, 5°C or below. When potentially hazardous food is cooled for an extended period, the food is subject to the growth of a variety of pathogenic micro-organisms. Bacteria grow ideally between 21 - 48°C. (The human body temperature falls in this range). The longer the time the food is allowed to be held in this range, the greater the risk of microbial growth. Excessive time for cooling potentially hazard food has consistently been identified as one of the leading contributing factors to foodborne illness.

Cross-Contamination: Bacteria (pathogens) can be transferred to food from utensils, surfaces (cutting boards), food workers hands, raw meats, poultry, fish and seafood. Contamination is the presence of disease-causing microorganisms or harmful substances in food. Food can become contaminated at any time and can be contaminated by other foods. To help prevent cross-contamination, raw meats, fish, and poultry must be kept away from cooked and ready-to-eat foods. (i.e. separate cutting boards, separation of duties, preparing vegetables before preparing meats). Employees need to minimize bare hand contact with cooked and ready-to-eat food. Equipment, utensils and food contact surfaces must be washed, rinsed and sanitized.

Room Temperature Storage: Temperature is one of the prime factors that control the growth of bacteria in food. Many types of pathogens and spoilage bacteria are prevented from multiplying to significant levels that cause foodborne illness with proper holding practices.

All food need to be stored cold 5°C and below or hot 57°C or above. Preparation procedures should have built in barriers to limit the time potentially hazardous foods are in the temperature danger zone. (5°F to 57°C.) (Hartmann and Dohle 2013)

Control measure to ensure foods are out of temperature for limited times include:

- Refrigerate foods before preparation.
- Prepare foods not further in advance than necessary.
- Prepare small batches of foods and return them to the refrigerator before cooking and serving.

Final Cook Temperature: Cooking requirements are based on the biology of pathogens. The amount of heat required to destroy the organisms will vary. Different species of microorganisms are susceptible to varied levels of heat. To kill all pathogens in food, cooking must bring all parts of the food to required temperature for a correct length of time. The temperatures listed in our code are high enough to take in consideration the time requirement. (Hartmann and Dohle 2013)

Serving Procedure: Develop good serving procedures to protect foods and customers.

- Employees should wash their hands after dusting and cleaning tables and after touching any item that can contaminate their hands
- Avoid touching ready-to-eat foods with bare hands. Use a utensil such as a tong, deli tissue or glove.
- Do not re-serve unwrapped bread, rolls, crackers, salad dressings, or relish trays.
- Avoid touching the food-contact surfaces of glasses, cups, plates or tableware.

Personal Hygiene: Personal Hygiene is keeping oneself clean and being a very neat and attractive atmosphere: It involves being clean from head to toe including clothing that one

puts on. Personal hygiene is very important in food selling, preparation, handling and storage. Good personal hygiene of each food worker is important to good food handling practice. It is equally important to observe these simple rules for personal hygiene:

- 1) Keep your fingernails cut short and clean
- 2) Wash your hands always
- 3) Cover your mouth and nose when sneezing or coughing
- 4) Keep wounds sores and boils covered
- 5) Wash your hands before touching or eating
- 6) Do not touch food with hands more than necessary
- 7) Do not use your tongue to taste food from a cooking spoon
- 8) Keep all pots, pans, dishes, cutlery and glasses clean
- 9) Avoid talking in the food environment while cooking
- 10) Avoid scratching your hair and body while handling food but if you do, wash your hand with soap and water before handling food.

Improper hand-washing is known to be the number one cause of foodborne illness in Washington State. Food service workers should wash their hands by applying soap and using warm water, scrubbing thoroughly, rinsing, and then drying using paper towels or a drying device. (Hartmann and Dohle 2013)

Food service workers must wash hands:

- before starting to work
- during work as necessary to prevent contamination of food
- after handling unclean items
- after handling raw meat, poultry, or aquatic foods

- after using the restroom (must wash twice, once in restroom and again in kitchen)
- after eating or smoking

Food service workers are required to use utensils to handle ready-to-eat food. (i.e. tongs, spoons, tissues, foil, gloves). No bare hand contact of ready-to-eat food. (Hartmann and Dohle 2013). Food service workers must maintain a high degree of personal cleanliness and restrain hair as necessary.

Accordingly, food handlers with poor personal hygiene and lack of awareness of important issues in preventing food borne diseases, working in food establishments could be potential sources of infections of many intestinal helminthes of protozoa and enterogenic pathogens (Nigusse and Kumie, 2012). All food handlers are required to use proper hygiene and sanitation methods when working with food. Food hygiene is the set of basic principles employed in the systematic control of the environmental conditions during production, packaging, delivery/transportation, storage, processing, preparation, selling and serving of food in such a manner as to ensure that food is safe to consume and is of good keeping quality. (Schlundt , Toyofuku , Jansen , and Herbst 2004).However, food itself can pose a health threat, a problem that is serious in developing countries due to difficulties in securing optimal hygienic food handling practices. The public health objective of food hygiene and safety is the prevention of illness attributable to consumption of food. This is because of adequate supply of safe, wholesome and healthy foods are essential for the health and wellbeing of humans.

According to Ifeadike, Ironkwe, Adogu, and Nnebue (2018) poor and faulty food handling practices have been identified as the leading cause of the majority of foodborne diseases. They identified some poor hygiene practices exhibited at work to include: lack of provision of medication by establishment, non isolation from work environment when sick,

irregular use of sanitizers and disinfectants, lack of change of hand gloves between ready to eat meal, irregular food hygiene training, non use of thermometer to check food temperature. This finding of the study is a strong indication of the poor health status and poor hygiene practices of food handlers/establishments in the FCT and agrees with the findings of Okojie, Wagbatsoma, and Ighoroge (2005) in Benin, who in an assessment of food hygiene among food handlers in a Nigerian university campus reported that the knowledge and practice of food hygiene and safety were poor.(Okojie et al 2005). It, however, differs from the findings of Isara and Isah (2009) who reported good knowledge and practice of food hygiene and safety among food handlers in fast food restaurants in Benin City, Edo State.

It is a known fact that chlorinated tap water kills *Salmonellae*,(Bryan 1988) yet many food handlers living in the city slums and shanty towns do not have access to potable pipe borne water and so are at a high risk of infection, especially with enteric fever known to be endemic in places of low personal hygiene and environmental sanitation.(Patrick, Findon and Miller 1997) This study has also established that food handlers in the Federal Capital Territory (FCT) constitute significant risk in the spread of enteric fever. It has also buttressed the role that food handlers play in disease transmission as several authors have reported. (Yang, Left, Mctague, Horvath, Jackson Thompson and Murayi 2013) However, given the time and money required to improve environmental sanitation, and increase the accessibility to potable water, the most rewarding option are regular food hygiene education and periodic screening of food handlers with a view to following up those found infected and getting them cured. According to Okojie et al, in their study, only about a third of respondents had pre-employment medical examination .Majority of the respondents in their study (89.3%) reported that they usually washed their hands before starting the preparation of food and after handling raw meat. A smaller number reported that they do not use hand wash detergent to

wash their hands before starting the preparation food and after handling raw meat. In studies conducted by (Altekruse, Street, Fein, and Levy 2016) and (Yang, Left, Mctague, Horvath, Jackson Thompson and, Murayi 2013) 87% to 92% of the respondents also indicated that they usually washed their hands before handling foods, and 62% to 100% that they also usually washed their hands after handling raw meat or poultry.

Effective hand washing therefore has been an essential control measure for prevention of pathogen. Less than one third of these respondents indicated using soap and water for washing their hands before starting the preparation of food and or after handling raw poultry or meat. Furthermore, it is most probable that majority of the participants do not wash hands according to good hygienic practices. This may be connected with lack of potable water and standard hand wash facilities in establishments. Even when such facilities are available, most participants do not have basic understanding of standard hand washing procedures. Other notable violations include; non-provision of thermometers for temperature control. It is important to note that further evaluation of the above mentioned factors is vital in foods safety and how best to control these factors is of importance in improving the system.

The study by Nigusse and Kumie (2012) to assess foods hygiene practices and prevalence of intestinal parasites among two hundred and seventy seven (277) foods handlers working in Mekelle university students cafeteria, Addis Ababa showed that there was practice of foods hygiene. They noted that the parasite prevalence rate was 49.3% with *Entamoeba histolytica* being the most common parasite. They concluded that the practice of foods hygiene among the study group was poor and they recommended improvement handlers' personal hygiene, frequent medical checkups and provision of conveniences for the handlers and consumers in foods

It was observed that respondents who used soap and water for cleaning, vended foods at locations that were relatively closer to water source, compared to other vendors who used other methods to clean their utensils. Unkept fingernails, skin lesions and poor foods protection from flies were some of the foods contaminating risk factors observed in the study. They concluded that there was the need for foods vendors and other foods handlers to be trained on basic principles of safe foods handling and they should be closely supervised. (Musa and Akande, 2003). The study by Isaac, Dominic and Wellington (2013) findings on foods hygiene practices: attributable to the influence of school authorities and the level of in-training of foods vendors, the study points out that foods vendors in educational institutions generally adhered to good foods hygiene practices, namely, regular medical examination (93%), protection of foods from flies and dust (55%); proper serving of foods (100%); good hand hygiene (63%); and the use of personal protective clothing (52%). They asserted also that regulatory bodies legally mandated to efficiently monitor the activities of foods vendors lacked the adequate capacity to do so and then concluded by saying that efforts should be geared towards developing training programmes for foods vendors as well as capacity building of the stakeholders.

The study by Mizanur, Muhammad Taha and Kamaluddin (2012) found that out of the 361 street foods vendors recruited, only 10.8% of them practices good foods hygiene, 71.5% had fair practice whereas 16.9% had poor practice. They found out also that training increased the foods safety attitude and practice. They finally recommended that continuous monitoring and periodic training incorporating basic principles of foods safety and microbial surveillance of foods is essential to optimizing foods hygiene in the foods vending business. In the study by Mulugeta and Bayeh (2012) of good foods hygiene, the following observations were made, after investigating the 455 subjects: 66% of the establishments had

flush toilets whereas 5.9% of the establishment had no toilet. Only 149 (33.6%) of the establishments had a proper solid waste collection receptacle. The study also noted that there was statistically significant difference between trained (professional) handlers and non-trained handlers with regard to foods hygiene practices. While more than 50% of the handlers prepare meals ahead of the peak selling time, more than 50% of the left over was poorly managed. They concluded that foods hygiene practices among the studied group was poor likewise the sanitary conditions under which they practice and recommended that educational programs aimed at improving the attitude of handlers be made available coupled with licensing of foods establishments and regular inspection of activities of such establishments.

The study by Elizabeth, Agnes, Sophia, Priscilla, Hamida, and Janet (2010) on “assessing foods hygiene standard practices among small scale foods handlers in central Accra, Ghana” observed that 40% of the foods handlers were located in unkempt places, while 60% were located in an acceptable area. 28% of the foods handlers did not comply with cleanliness of their cooking utensils. With regards proper storage of raw and cooked foods, only 70% of the foods handlers had compliance, and 64% used equipments to serve. Cleanliness of cutleries for service recorded 65% of non-compliance. 58% had neat appearance and used cleaned napkins for service whilst 42% of them did not. 31% of the food service establishments did not put correct measures in place for the control of flies in their service area, and 5% cleaned their hands before serving foods. They concluded that there is the need for more effective information and creative ways to disseminate foods hygiene principles to these small scale foods service providers. In most of the literatures reviewed above, it could be noted that most of the foods handlers had good knowledge of foods hygiene but this did not translate into good practice of foods hygiene. From literature too, majority of these handlers had unacceptable practices especially with regards hand washing at

the right time and with the right materials, wearing of protective apparels, proper cleaning of cutleries and utensils, knowledge of when not to handle foods and good behavior while handling foods, location of eating establishment in the right place, meeting the correct standard of a restaurant and provision of adequate and well maintained facilities for convenience. Regular monitoring of the activities of the foods establishment by designated authorities will ensure that high standards are maintained at all time.

Food hygiene is such an important issue because the import of improper food handling both at home or away from home can be devastating where facilities are not readily available to tackle the challenge. Food poisoning or food borne illnesses, which often results from improper food handling, is too serious to under-mind. So adequate food hygiene Practices for food Handlers and others alike should be encouraged.

Facilities in Foods and Nutrition Practicals in Secondary schools

Foods and Nutrition Laboratories facilities include:

combi/steam/conventional ovens (Rationale)

full-size blastchiller

walk-in fridge

walk-in freezer

grill

fryer

high capacity steam-jacketed kettles

proofer

autoclave

high-capacity mixer (floor model)

packaging machine

ice cream machine

meat slicer

vegetable cutters

Integrated stainless countertops, with one wheelchair-accessible

Post per workstation

Induction plates

Gas stoves with ovens

Table-top mixers

Industrial table-top food processors

storage units and roll-in refrigerators

Others include, work table, sinks, dish washer, blenders, pots, sauce pans and frying pans, cooking spoons and knives and utensils among others. Foods and Nutrition Laboratories provide the best possible location for hands-on training programs, and product development and testing.

Gender and Foods and Nutrition Practicals in Secondary schools

Gender is the condition of being construct which distinguishes the role behavior, mental and emotional characteristics between male and female (Keller, 2011). It is expressed in many spares of human endeavour its level of demonstration varies with time, place and culture. It relates to the circumstances of discrimination against a person, politics, religion, economics and social services and determines the level of Political and Economic empowerment that keep certain group of people at advantaged position. In relation to offering Foods and Nutrition in secondary school male gender has been a problem and the females mostly undertake the subject.

Since gender is defined as “Sex” and bias is defined as “Preference or inclination that inhabits impartiality; prejudice” (Azubuike 2012). Thus, gender bias is separation of gender in a way which prefers sex over the other. Gender bias in Home economics refers to preference for or favoring of one sex, and the other in study of Home economics. As can be seen, gender bias in Foods and Nutrition is a multifaceted and complex issue. Nevertheless, the problem of gender in quality in Foods and Nutrition is not only a national concern but that of the whole world at large. Thus the misconception of Foods and Nutrition as a woman’s subject. A gender gap exists between males and females in the study of Foods and Nutrition.

An evidence of this gender gap is that the gender starts at home. The home provides the child with first experience, these include the models with which the child can identify, the parents provides a range of materials for home play, there are also value system which are basic to special roles. The children quickly learn that the roles of men in the family are different from the role of women. This differential role of boys and girls constitute a serious problem to Home economics studies as it affects the male students from undertaking Foods and Nutrition as a subject.

Often times, subtle message are sent to girls and boys about expectations for their behaviours, attitude, perception and other aspects in their lives. It is important to note that this is not always the case nor is necessarily intentional. Many parents, educationists and the society out there are indeed very sensitive to the issue of gender. They are making great strides to create equity in all areas for males and females. On the other hand, there are those parents, educators who are shocked and surprised to realize that they unintentionally separate signals about expectations for girls and boys. Differential treatment by educators and parents divert boys from the study of Foods and Nutrition.

It is apparent that there is a gender gap in Foods and Nutrition, there are variety of theories as to why males lose interest in Foods and Nutrition. One speculation is that boys simply approach Foods and Nutrition differently. Some point to parental influence, some blame teachers and the overall educational institution. Still other ideals lay the origins of this gap at role models or lack of role models. Another cause of the gender gap in Foods and Nutrition is believed to be the society. Although the most common point to a combination of all the factors, each of the major influences will be discussed individually.

Teachers and educational system are believed to influence the gender gap in the study of Foods and Nutrition Teachers may treat girls differently than boys causing differing expectations for instance boys and girls are often approached different when dealing with inappropriate physical and verbal attacks on each others, as such boys may want to say that are more task oriented than girls (Miller and Abrahams, 2009).

The lack of strong male role model is believed by some experts to be yet another reason for the gender gap in the study of Foods and Nutrition between males and females suggested that providing children the opportunity to see guest speakers from both genders in nontraditional communication careers. Sense tells us that we find possibility or lack of possibility in what we experience. Females who see and develop communication with other females who have careers in science and technology field will be more likely to have these high expectations for themselves. These males will perceive Foods and Nutrition plausible career for themselves. It best that parents are the most important influential people in a child's life. Parental views on gender roles, belief system regarding genders, and actions towards both sexes will inevitably influence children. Children are sent strong signals about the world around them more specifically about men and women, from parents. Parent's

actions and words send messages about the parents' beliefs. Parent should closely examine what they say with their action or words.

Okorie and Ezeji (2008) state that some parents

are not guiding their male children well to develop interest in the study of Foods and Nutrition subject. They would want their children to develop interest in Law and Medicine rather than Foods and Nutrition. Ossai (2006) emphasized that the influence of parents on the male's interest in the study of Foods and Nutrition is unquestionably one of the strongest and most persistent factor determining what the child interest in school would be. Parents are often more interested in occupations or profession which will bring money and prestige to the family, then in suitability of their children for a particular career (Okoh, 2006). It is therefore imperative that parents always set aspirations of their children hence they would not want their male children to study what they regard as woman's subject. Consequently the name given to the course tend to discourage females and males mostly males in studying the course. Thus, women are known to be mostly involved in home domestic works or activities. The makes interest in the study of Foods and Nutrition started from home (Ferry, 2008) stated that the "root causes of gender gap in Foods and Nutrition is from home". The home provides the materials for playing role difference which create gender differentials among the children of the home. To curb this problem, we stated that parents should not give room for anything that should create gender difference among the children since this tends to make the children loose interest in some areas of life particularly males that would not want to fall the line of Foods and Nutrition as subject/course. Asia Pacific University (APU) (2008) emphasized that parent should guide and educated male children on the importance of Foods and Nutrition in societal building since it is going to help the males to offer Foods and Nutrition as a subject. In the same vein another issue why males are not interested in the study of Foods

and Nutrition is poor orientation. If males still in secondary schools are given good orientation about the study of Foods and Nutrition as a course in tertiary institutions of learning, the males will study it particularly when the males must have been taught about its merits and demerits and career areas that are available to it. Foods and Nutrition will arouse the males' interest for them to know that Foods and Nutrition is not just all about cooking or domestic works. Dike (2006) suggested that if career days are organized by schools from time to time, it will help motivate and stimulate the interest of students as the students listen to some experts in the various areas of Foods and Nutrition. This is because some male students would want to study Foods and Nutrition but because such students were to shy away from the course whereas it is a course which the students would have done better in, than the other subjects. Conclusively, male students should be encouraged to offer Foods and Nutrition as those who are interested, have recently seen taken over confectionary business from the females.

Instructional Methods for Teaching Foods and Nutrition Practical

The subject Foods and Nutrition involves the use of a number of teaching methodologies depending on the topics being covered, level of understanding of the learner, available resources, teacher competences, as well as availability of time. These methodologies are designed to enhance the learners' knowledge and skills acquisition. Its *hands-on* approach enables learners to develop manipulative skills and they end up having refined motor skills. According to Sprinthall and Sprinthall (1991), it is like a baby to a lump of clay that can be moulded and fashioned into any shape by the hands of the master craftsman, who is the teacher. So if the master craftsman fails to mould the baby well, then malformations are likely to occur and if not rectified in time, these will dwell with the child for a life time.

As put by Mahundi (2015) a teaching method is primarily concerned with the most appropriate presentation of lesson material in any given circumstance. No single method will serve equally well in all situations. In as much as teachers are inclined to favour particular styles and techniques dictated largely by subjects taught as well as their personality make-up, it needs to be pointed out that no teacher can solely rely on a single method. In this case, Mahundi, (2015) is implying that in the course of presenting his lessons, the teacher is invariably required to use a variety of methods. While it is true that each subject has its own special method, leading educationists such as. Rousseau (1712-78), Pestalozzi (1746-1827), John Dewey (1859-1952), Maria Montessorri (1870-1952) and Hebert Spenser(1820-1903), among many others, have stressed the importance of general method. For Pestalozzi for instance, drew attention to the need for personal experience in learning. Spenser on the other hand, provides a number of teaching maxims, such as to proceed to teach from the known to the unknown, simple to complex, concrete to abstract and from the specific to the general. It has to be noted that the development of a general educational method has not taken place in isolation, but rather is a result of the developments in other spheres of education. It has been influenced by changes in theories of psychology of learning as well as the philosophical conceptions of the nature of man.

Quite a number of teaching methods have been in use for centuries. Others have evolved along the way, while others are mere modifications of some classical methodologies. Kochhar (1997) stresses that the choice of a teaching method/s depends largely on the information or skill that is being taught. It may also be influenced by the aptitude or enthusiasm of the students. For Foods and Nutrition practical the following methods are used in enhancing teaching in secondary schools and others institute alike

Demonstration: As far as practical subjects are concerned, demonstration is the best known teaching method. It is used to guide the development of the pupils' psycho-motor skills to be efficient. Farrant (1990) defines demonstration as a practical form of learning by imitating. On the other hand, Gatawa (1990) defines it as a direct means of explaining things to pupils. During demonstration, people are informed about how to carry out a particular task, with possible inherent dangers being explained or shown. It has strength in that it calls for an increased degree of attention, concentration and interest which can be further exploited by other techniques, i.e. pupils will be creative in their way of thinking. The increased activity level of pupils leads to the acquisition of new knowledge and skills which will be useful in future. Another strength of demonstration is its ability to provide a concrete and realistic visual picture of what is being presented to supplement word images. This usually results in a more lasting impression, according to Kochhar (1997). The senses of sight, smell, touching, hearing or taste are enhanced and the experience builds tangible images in the minds of the learners which may be very permanent. The demonstration can be spot or step-by-step, depending with the skill being taught. This is a key method in the teaching of Foods and Nutrition because of its pragmatic approach, because after demonstration, the pupil must be able to follow suit, (Kochhar, 1997). Some of its weaknesses are: lacks student focused learning. A drawback of traditional training is that it inherently places the most value on standards, curriculum and passing tests as opposed to student-focused learning, lacks process oriented learning, lacks of interactivity and so on.

According to Mahundi (2015), demonstration was singled out as the most commonly used method of teaching Foods and Nutrition practicals. In justifying the choice of method, demonstration was said to be very efficient, since during practicals it helped pupils to grasp skills well since they would observe and experience the process/skill. Demonstration helps

pupils to understand and master different techniques and skills from the teacher, and in return they will also be able to practice these skills as pupils see reality in what they are doing. This therefore ensures good results in practicals and quick grasping of ideas. This method also helps pupils to identify and remember ingredients and equipment used. Above everything else, demonstration is effective as it uses a multi-sensory approach e.g sight, feeling, hearing and smelling.

Explaining/Lecture: Explaining or lecturing is the process of teaching by giving spoken explanations of the subject that is to be learned. Explaining or lecturing is often accompanied by visual aids to help students visualize an object or problem. Lectures on the other hand are often geared more towards factual presentation than connective learning. It is a very appropriate method for enhancing learners' acquisition of knowledge. Montessori (1969) highlights the need to have a child taught how to do a task before execution of the task. The lecture thus becomes the foundation method upon which other strategies are going to be built to complete the process of learning. Other methods like the demonstration or experiment method can only be effective on condition the lecture method has been made proper use of. At the end of the day, it becomes clear that no one single method can work on its own. According to Mahundi (2015), the explaining/lecture method was said to enhance learners' acquisition of knowledge. It is through this method that pupils get to understand what they are going to prepare during practicals well in advance. On the other hand, group work was justified as being helpful to pupils in promoting cooperation and sharing of ideas among pupils in class. Every individual is likely going to participate and this is also an ideal method during practical lessons. Class discussion was also selected by some teachers because of the easy interaction it offers among pupils. There is sharing of ideas amongst pupils and also between teacher and pupils. But the method becomes problematic if there are no materials

available to work with. Students tend to forget what was taught by the teacher and how to carry out the practical if left alone.

The Discussion Method: This method comes in handy and is most effective when stimulating and facilitating the learning process. The discussions can be carried out in groups or even at classroom level, where learners interact sharing new and old ideas and enriching their knowledge. According to Wikipedia, free encyclopedia, discussions are superior in contributing to the application of the materials learnt and building attributes that are important in shaping behavior patterns. Pupils easily understand when they discuss what they have learnt as they will be clarifying understood concepts. As such, pupils will not easily forget what they have discussed. Team spirit or a spirit of oneness is built through discussions. Farrant (1990) posits that discussions enable children to get on well as they are involved in group activities and discussions. Children may have a positive attitude and behavior towards others. According to Mahundi (2015), class discussion was selected by teachers because of the easy interaction it offers among pupils. There is sharing of ideas amongst pupils and also between teacher and pupils he maintained.

Experimentation: This is an approach that involves laboratory work where learners solve their problems with practical apparatus. Pupils make trials in order to study what happens and gain knowledge and skills through examining, investigating and observing to come up with conclusions. Dewey, who advocated for the pragmatic philosophy to teaching, highly encouraged the use of experimental methods in the teaching. In other words, pragmatism according to Dewey is an overriding philosophy in practical subjects because it is a philosophy of action and deeds, which encourages practical activities by pupils to be well executed. For instance, in Foods Science, the experiment method can be used when testing for the presence of starch using iodine solution. Both the test and control groups will be

observed. The blue-black colour signifies the presence of starch. Pupils will be involved in putting the reagents together and making necessary observations and making recordings. The experiment method, together with the demonstration method is key in the teaching of Foods and Nutrition and they promote content mastery and skills manipulation by pupils. Although, less frequently used through experiments, learners discover for themselves as they can easily see results and capture concepts quite clearly. (Mahundi, 2015).

Project Method/ Problem solving method: This is another teaching methodology which employs a participatory approach. This is whereby pupils are given tasks to execute and discover on their own as they actively participate as individuals through use of their own hands. The project method originated in the USA with the rise of progressive school movement. A project was described as a large problem of practical concrete, manipulative type, which challenges the interest of the student and draws out his powers of planning in the actual solution of his problem. Its essence and advantage is that pupils will remember vividly activities done through this method and promotion of cooperative group work. Pupils share ideas, experiences and knowledge and they develop a sense of responsibility and display initiative and self criticism. Mahundi concurs with Williams (2001) that the teacher's responsibility is to ensure that pupils learn from one another, with each pupil contributing his share on the basis of his ability and interest. The more mature pupils undertake the abstract and difficult features of the task, while leaving the simpler and routine elements to others. Also concepts learnt can also be used to solve immediate problems and even those encountered in the future. Sprinthall and Sprinthall (1981) states that if children are engaged in problem solving activities, they learn better. Problem solving enables children to apply the knowledge and skills gained if they face the same problems at home. Problem solving method involves identification of the problem and devising a plan. However, it has to be

noted that projects require a lot of time, they cut across ordinary class teaching and normal timetable arrangements. They do not have to be overstretching as this will result in lack of coordination and pupil enthusiasm and interest will be lost.

Collaborating: Collaboration allows students to actively participate in the learning process by talking with each other and listening to other points of view. Collaboration establishes a personal connection between students and the topic of study and it helps students think in a less personally biased way. Group projects and discussions are examples of this teaching method. Teachers may employ collaboration to assess student's abilities to work as a team, leadership skills or presentation abilities. Collaborative discussions have many forms, e.g. fishbow discussions. After some preparation and with clearly defined roles, a discussion may constitute most of a lesson, with the teacher only giving short feedback at the end or in the following lesson.

Learning by Teaching/ peer teaching: In this teaching method, students assume the role of teacher and teach their peers. Peer teaching is also known as the monitorial system, (Farrant, 1990). Students who teach others as a group or as individuals must study and understand a topic well enough to teach it to their peers. By having students participate in the teaching process, they gain self confidence and strengthen their speaking and communication skills. In this system, pupils communicate with other pupils those lessons they have been taught by the master teacher and this is a way of multiplying the person and skill of the teacher and encouraging bright pupils to exercise their gifts. Since the very act of teaching requires that one understands what s/he is going to teach, this becomes very beneficial to the pupils who are thus helped to develop maturity as a result of the responsibility placed upon them.

Debates: This is a scenario where the teacher gives a topic for discussion with students grouped into two groups opposing each other for the purposes of constructive criticism. This is when intelligent minds come together. According to an internet reference, it is a discussion, as of a public question in an assembly involving opposing viewpoints, (dictionary.reference.com/browse/debate). In Foods and Nutrition, Traditional methods of cooking are more nutritious than those of today, can be a topic for debate. Teacher's role is that of facilitating the debate making sure it remains focused.

Guided Individual Discovery/ Self discovery learning: Discovery is an instructional method which allows the students the independence to use their mental processes to contribute to knowledge, understand hitherto difficult concepts, generalizations and principles or provide answers to problems suited with minimal guidance from the teacher on the attainment of instructional objective. Discovery method is students centered and agrees with the early psychologist like Bruner, (1990) who said that learning involves activities processing of information, this is organized and constructed in a unique way by each individual. The processing will lead into exploration and discovery. Discovery method can be guided and unguided and the unguided can be inductive or deductive. Both guided and unguided discovery involves finding out and requires students to engage in some complex mental processes including:

Formulating problems for investigation,

Formulating hypothesis to guide investigation,

Design experiment to collect data, making generalization from knowledge required from data, to find solution to problem,

Developing certain scientific attitude like objectivity, curiosity, open mindedness and honesty.

According to Farrant (1980), discovery learning is sometimes known as heuristic method. Mahundi (2015) also reiterates that apart from being called the heuristic method, the discovery method, as termed by Hebert Spenser, is the art of making children discover things for themselves. Its claims are such that, *“knowledge gained by self effort and discovery is better assimilated and remembered than that which is merely memorized,”* (Farrant, 1980:46). Spenser states that children should be told as little as possible and induced to discover as much as possible. However, it has to be noted that, it is not easy to strike a sound balance between providing too much and too little guidance and the system can only work where there are good supplies of well indexed resource material.

Field Trip: According to Mahundi, (2015), field trips offer the opportunity for pupils to observe production stages taking place, example, in the processing of milk and other dairy products. The opportunity granted by the field trip is a real life experience and the information comes from an expert in the area who is actually demonstrating on the job hands-on experience. However, such trips are often dismissed as very costly for most schools, no wonder why they are a rare phenomenon.

Practical Demonstration Instructional Method: Teaching and learning using Practical Demonstration method means tasks in which students/learners observe or manipulate real objects or materials or they witness a teacher demonstration. Practical means connection with real situation rather than with ideas or theories (Oxford Advanced Learners Dictionary, 2001). Similarly, practical can be defined as knowledge acquired through practical or action rather than theory. Opuh, Eze and Ezemagu (2008), explained practical as a scientific study or an experimental set-up rather than dwelling in the theory and ideas on the introduction to

the international senior secondary School certificate examination syllabus. West African Examination council (1998-2003) emphasized the necessity of practicals in learning.

Practical knowledge, according to James (2000), refers to that knowledge which is connected with reality rather than ideas and theories. It is the knowledge acquired through the practical approach to carrying out scientific investigation and teaching. In the words of Mankilik (2011) practical approach means any teaching and learning activity which involves at some point the students (learners) in observing or manipulating real objects and materials. The term practical is used in preference to laboratory work because location is not a salient feature in characterizing this kind of activity. This means that the observation and manipulation of objects could take place in a school laboratory (a specialized defined building equipment with apparatus) or in an out-of school (outdoor laboratory) setting, such as the learners home (boiling, cooking and freezing of water using mirrors, laundry, making soap to bubble and foam, etc). According to Polman, (2000) teaching without practical are like having a world of men without women, or vice versa. This statement underscores the importance of practical in learning.

According to Science Community Representing Education (SCORE), practical work means “hands-on” learning experience which prompts thinking about the world in which we live (SCORE, 2008:64). Besides, practical work can also be defined as “...learning experience in students interact with materials or with secondary sources of data to observe and understand the natural world” (Lunetta, Hofstein, and Clough, 2007:65). Experimental work and scientific investigations are another ways to be called as practical work (Ramnarain, 2011).

Hands-on methods are suggested in constructivist-based learning (Ng and Nguyen, 2006). Another alternative constructivist learning approach is the use of practical work in

science teaching and learning. By having real-life phenomena, students are given the opportunities to evaluate and measure their views and to improve the understandings before the learning process (Ng and Nguyen, 2006). Practical work creates exceptional learning surrounding that help student to construct their knowledge, enhance logical, inquiry and psychomotor skills (Mashita, Norita, and Zurida, 2009). Besides, practical work offers an interactive experience to the students where they can broaden the scope of constructivist learning (Umar, Ubramaniam, and Ukherjee, 2005). The education system in Malaysia and Nigeria is still very exam-oriented which focuses on examination results and marks (Sharifah Fauziah, Farah, Ismin and Izwani, 2012). Malaysian and Nigeria teachers are also unfamiliar to apply constructivism approach in teaching. Therefore, teachers will be more to teacher-centred rather than student-centred and constructivism approach is unachievable (Arlina and Melor, 2014). In secondary schools, practicals are designed and conducted to engage students individually, or in small groups (student experiments) and in large-group demonstration settings (teacher demonstrations) (Hofstein and Mamlok-Naaman, 2007).

It is believed that by having practical work, students' knowledge can be expanded to understand the real world (Millar, 2004). According to Ozdener's study (as cited in Tüysüz, 2010), it is generally known that students can gain knowledge of personal observation and involvement in practical work. Teaching objectives can be achieved easily by doing practical work especially (El-rabadi, 2013). Furthermore, first-hand knowledge will be generated where students can understand the abstract ideas which are difficult to explain during the class (Osborne, 2002). Students' understanding of theories and models can also be developed (Millar and Abrahams, 2009). According to Inal's study (as cited in Musasia et al., 2012), students are faster to understand the concepts when they test the experiment by themselves as they can touch the materials and apparatus which make them believe in the experiment.

According Mwangi, and Kibui (2015) students exposed to practicals performed better than those taught without the practicals. Their results showed that practicals have a significant positive effect on learners' performance in secondary school. This implies that there is a positive linear relationship between practicals and learners' performance in secondary school. Therefore, the use of practicals should be considered when teaching and learning.

Practical work influenced and improved students' academic performances where students can recall what they see and touch rather than what they listen (Adesoji and Olatunbosun, 2008). For weaker students, it is advised to use practical work while teaching as they can perform better compared to other students who taught by lecture method (Odubunmi and Balogun, 1991). Besides, there are studies found that to school where practical work are carry out has a greater effect on their students' academic achievement in science courses (Sabri and Emuas, 1999). As we know that practical work can create good results in science (Buthelezi, 2012). Moreover, students who did well in the practical work can also excel in final examination (Musasia et al., 2012). The reason is that practical work helps students to remember the apparatus and equipment that have been used and gradually students' manipulative skills can be developed (Sani, 2014). It makes students have a deeper understanding of the subject content (Musasia et al., 2012). If a practical work is well planned and delivered expertly by the teacher, it may give an impact to students in their learning process (Lee, and Sulaiman, 2018).

Opuh, Eze and Ezemagu (2008), observed in line with Addeye that schools which are involved in practical classes perform better in examination than those that neglect practical work'.

Practical work in literature has been referred to in different ways: 'experimental work; scientific investigations (Ramnarain, 2011); 'practical and investigative activities' (SCORE

2008), and 'laboratory investigations' (Kibirige and Tsomago, 2013). The broad perspective of 'learning experiences' will be understood to include the wide range of practical skills, thought and processes that constitute doing science as 'what scientists do' (Benner, 2011).

Some authors in science education and related areas contend that practical work in science has many purposes (Woodley, 2009; Hodson, 1990; Vilaythong, 2011). For instance Watts (2013,) lists some of these purposes to include:

Motivation for students –the excitement of discovery, consolidation of theory, development of manipulative skills, knowledge of standard techniques, general understanding of data handling, development of other skills (e.g. analytic, evaluative, planning, applied, mathematical) and understanding of how science works: concepts of scientific process, collaborative working, reproducible results, fair testing."

Another purpose for practical work is the understanding of errors and how to design practical procedures in order to improve precision and accuracy. Students acquire skills for safety; risk and precaution against hazards in the laboratory (SCORE, 2008). Practical work also provides learners with evidence to support their understanding and to concretise scientific principles (Jormanainen, 2006). Thus, learners are exposed to basic processes of science through practical work.

Practical work has traditionally been a 'recipe-like' activity that had minimal cognitive engagement and did not inspire originality in students (Bigelow, 2012). Research by The National Research Council (NRC, 2003) and (National Academy of Sciences (NAS), 2010) have recommended that during practical work learners should be investigative, design their own experiments, record and analyze as well as find their own answers. Driver (1983) suggested that instead of learners dealing with already known answers, such as determining

known constants, they need to investigate novel problems. In this way practical work supports development of scientific skills, thinking skills and how scientists work. However, other researchers found that the inquiry approach in practical work requires much time and a session of one hour is never enough (Abraham and Millar, 2008). Practical work caters for learning in different ways such as experiential, independent, team and peer dialogue (Zimbardi, Bugarcic, Colthorpe, Good and Lluca, 2013). Different learning styles have the pedagogic benefit of enabling correct concept development. They underscore the empirical nature of science, measurement, repeatability of experiment and learners may enquire as real scientists do. While these pedagogic benefits have yielded encouraging results in science classrooms elsewhere, this has not been the case in South Africa (Buthelezi, 2012, Mji and Makgato 2006). Onwu and Stoffels (2005) using mixed methods research with 53 practicing teachers in Venda, Limpopo established that most teachers had ‘little experience, meagre training, and operated in large and poorly resourced science classrooms’

Literature is awash with the observation that practical work produces good performance in science (Kerr, 1963; Muwanga-Zake, 2008; Watts, 2009). Despite such observations, Kahle (1999, p2) noted that *Schools are only as good as their teachers, regardless of how high their standards, how up-to-date their technology, or how innovative their programs*. Similarly, low level content, lack of practical skills and negative attitudes towards innovative science teaching are the problems besetting teachers and consequently teachers do not use practical work in their science classes (Onwu and Stoffels, 2005; Lubben et. al., 2010; Kibirige and Tsomago, 2013).

Kulshretta (2013) noted some advantages of practical activities in science to include; skills development, planning, manipulation of equipment, observation, analyzing, evaluating, experiential learning, testing out own ideas, testing out theories, developing of problem

solving strategies and team work. Other advantages strategies for effective conduct of practical chemistry works in senior secondary schools by Achimugu (2014) in his study , include- taking responsibility, developing students as self-learners for independent learning, students work at their own pace, at their own level, supporting differentiation by outcome, task and questioning. This enables them to build self- confidence, learning in different ways, working as individuals, manipulating materials and objects, observing the use of all the senses and having informal dialogue with peers and teachers to develop personal, learning and thinking skills (PLTs). These therefore require that science students should be adequately taught through practical activities to acquire useful practical skills in science concepts.

The use of practical manual as ‘hands on’ activity in science learning supports the development of practical skills, help to shape students’ understanding of scientific concepts and phenomena. A good- quality practical manual can engage students, help them to develop important skills, help them to understand the process of scientific investigation, and develop their understanding of concepts. Practical manual provides a range of information on how to carry out investigations in various situations such as a step-by-step explanation of producing alcohol (local gin) from fresh palm wine used as methylated spirit and for anesthetic purposes. It is built on the acquired expertise, knowledge and judgment of users in their respective areas of work that practical. (Etiubon and Udoh 2017).

When practicals are used by the teacher when teaching, these will make the understanding of the concepts clear. Furthermore, practicals are learning tools which help students to concretize concepts and compare the theoretical, practical and real words. These practicals also arouse interest in students. Practical help the teacher and learner to bring the real world into the laboratory and help the learner compare the two and thus have better understanding of the principles (Chiu and Lin, 2002). Students will learn the science concept

by doing experiments in the laboratory which is a different approach from “Chalk and Talk” method (Bruner, 1990). Therefore, laboratory experiment is one of the examples of practical work in secondary school level (Musasia et al., 2012).

Laboratory manual is a practical guide for systematically directing students on how laboratory procedures are to be carried out. It gives the guideline for clear explanation and instructions regarding rules and regulation, material, time and space management and students’ commitment to responsibilities. It provides general and specific guidelines for activities frequently performed in science laboratories. According to Nurzatulshima (2008), laboratory manual provides an authoritative collection of core experimental procedures that engage students’ psychomotor activities for wider application of knowledge.

Laboratory has been defined by several authors in different ways. Maduabum (1992) sees a laboratory as a place where scientific exercises are conducted by the science teachers for the benefit of the students (learners). The laboratory exercises include; experiments, and other activities which help the students in acquiring scientific skills. Ezeliora (2001) defined science laboratory as a workshop where science is done or where scientific activities are carried out under conducive environment. She also sees the laboratory as a place where science equipment, materials or instruments are housed for security and safety. Igwe (2003) observed that a laboratory can be in door such as the sufficiently designed and equipped room found in most schools or outdoor involving such places as riverside, workshop, field and even market for carrying out scientific studies. He further stated that whatever the type of laboratory employed in science teaching, the same laboratory experience should be attained, that is a participation in the series of experimental, observational and demonstrating activities which provide opportunity for students to develop understanding of practical and theoretical concepts through solutions of problems. According to Omiko (2007) a laboratory is a room,

or building or a special period of time equipped and set apart for practical or experimental studies to take place. He sees the laboratory as the heart of a good scientific programme which allows students in the school to have experience which are consistent with the goals of scientific literacy. This implies that science teaching and learning cannot be completely done in a secondary school where there is no equipped laboratory. Ufondu (2009) observed that the laboratory is an indispensable organ of the school, if effective teaching and learning are to be achieved especially in science and science related subjects.

Hornby (1998) defined laboratory as a room or building used for scientific research, experiments, demonstration, testing and analyzing of data etc. However, whatever is done in the science laboratory is to obtain or acquire skills that would help to advance scientific knowledge which subsequently would lead to the development of the human society. Dienye and Gbamanja (1990) observed that laboratory method of teaching is an activity involving a two-way approach carried out by one or more persons through the exercise and experimental approaches both of which are useful in science teaching. The experimental approach provides an opportunity for students to seek information using experimental procedures. These procedures call for careful observations and interpretation of data. It has the qualities of questioning, investigating and confronting the unknown. Udonfu (2009) and Omiko (2015) observed that the use of the laboratory in teaching has the following benefits:

- (1) Laboratory teaching makes the students/learners to learn about the nature of science and technology in order to foster the knowledge of human enterprise of science and thus enhance the aesthetic and intellectual understanding of the child. Dienye and Gbamanja (1990) in a book science education, theory and practice opined that science is known to be a way of doing certain things by the observation of natural phenomena, quantifying the observed thing, integration of such quantities and interpretation of the

results in order to make useful meaning out of the exercise. The students can identify cause and effect relationships and in this process develop important skills.

- (2) Learning scientific inquiry skills that can be transferred to other spheres of problem solving (that is acquisition of problem solving skills). One of the basic goals of science education is to help students learn skills that can be applied to other life situations in future. It thus follows that the exercise of transfer of such learning condition must have something in common with the situation to which it will be applied.
- (3) Students learning to appreciate and in-fact, emulate the role of the scientist through acquisition of manipulative skills. The students should be allowed to investigate by:
 - (a) Indirect observation of objects and materials for the acquisition of mental as well as manipulative skills, example measuring substances, using weighing balances pictures, cylinder, etc.
 - (b) Through multiple trials, students can in the process of fiddling with materials and activities without stated theories arrive at useful conclusions.
 - (c) Given a known theory, students can be guided to observe some phenomena selected by the teacher and from such observation make predictions that are likely to occur.
- (4) Developing interests, attitudes and values by considering what science entails, it is clear that a field experience has the best potential for stimulating a life time interest in science in the students when accorded the chance for personal experience by handling the real things. Students interest in science increases as they yearn to investigate and explore more about their environment.

According to Hancy in Omiko (2007), eight (8) aspects of scientific attitudes exist all of which can be nurtured in the science laboratory in the school. They are; (i) curiosity (ii) open mindedness (iii) objectivity (iv) intellectual honesty (v) rationality (vi) willingness to suspend judgment (vii) humility (viii) reverence for life. Laboratory instruction is considered essential because it provides training in observation, supplies detailed information, and aroused pupil's interest. Dienye and Gbamanja (1990). They also went further to say that “developing and teaching in an effective laboratory requires as much skill, creativity, and hard work as proposing and executing a first-rate research project. They also listed the following number of possible goals that can be achieved through a developed laboratory programme: (i) develop intuition and deepen understanding of concepts (ii) apply concept learned in class to new situations (iii) experience basic phenomena (iv) develop experimental and data analysis skills (v) learn to use scientific apparatus (vi) learn to estimate statistical error and recognize systematic errors (vii) develop reporting skills (written and oral).

Omiko (2007), listed five groups of educational objectives that may be achieved through practical instructions.

1. Skills: manipulative skills, inquiry skills, investigative skills, organizational skills and communicative skills.
2. Concept of mastery: For example, hypothesis, theoretical model, taxonomic category.
3. Development of cognitive abilities: Critical thinking, problem solving, application, analysis, synthesis
4. Understanding the nature of science – scientific enterprises, scientists and how they work, existence of a multiplicity of scientific methods, inter-relationships between science and technology and among the various disciplines of science.

5. Development of scientific attitudes: For example, curiosity, interest, risk taking, objectivity, precision, confidence, perseverance, satisfaction, responsibility, consensus, collaboration, and liking science. The major disadvantages of this method are that it is time consuming and expensive to organize.

Yusuf (2003) classified most laboratory approaches to teaching into five distinct groups, namely: (a) verification and deductive; (b) inductive; (c) scientific oriented processes; (d) technical skills-oriented processes; and (e) exploratory oriented skills. The verification deduction approach endorses laboratory sessions where students are presented with concepts and or conceptual frameworks as well as the procedural instructions which are designed to enable them verify the concepts involved. In inductive learning sessions, students are required to examine, group and label specific bits of information to find patterns; by means of these, they are enjoined to develop a set of working hypotheses regarding prospective concepts they are bound to encounter; this procedure often requires the collection of evidence to verify or refine any hypothesis raised. The scientific oriented processes are constituted into actions; these processes are classified into basic processes and integrated processes (Marceno, 2000; Yusuf, 2003). The basic processes are reflected thus: observing, classifying, communicating, measuring, predicting and inferring; the integrated processes are re-counted as follows: identifying and controlling variables, formulating and testing hypotheses, interpreting data, defining operationally, experimenting, and constructing models. This is related to Dave's 1970 (theory) Psychomotor Domain Taxonomy (PDT), his five levels of skill performance. That is progressing from one stage to the other, from the most basic to the most advanced

Attitude of Secondary School Students Towards Foods and Nutrition Practicals

Foods and Nutrition commonly is a sub set of Home Economics and is of paramount importance in helping to raise the community's living standards and is thus a vital factor on social and economic development of a nation. From literature reviewed, it observed that Foods and Nutrition education has a critical role to play in the developing countries of the world. Most of these developing countries are apparently still not convinced of the importance of this subject area, and to this Spafford (2000) reported that "the public is largely unconvinced by the importance of this subject." Observations in recent literature as well as in writings dated as far back as 1930s show that most students fail to select Foods and Nutrition subject because / their parents regard the subject as "inferior and degrading," and others because it has no immediate vocational value.

However, such an issue has been proved wrong by Spafford (2000) when he observed the following in as far as career aspirations in Foods and Nutrition is concerned:

"Students in Foods and Nutrition should come to know themselves better - their assets and liabilities for employment - as well as the job demands of many different occupations. The field has much to offer in increasing the general employability and job satisfaction of all youths".

Scott (2009) stated that many people within and outside the profession view Foods and Nutrition in schools and colleges as a special subject primarily for young women and a few brave young men. This statement seems to be documented by studies showing that 99.9% of Foods and Nutrition college graduates are women. (McGrath, 2008; Sciiab, 2006). Similarly on another note, many studies have shown that Foods and Nutrition as a course as compared to other courses lack prestige, glamour, and academic respectability. Such a situation can only be improved if administrators and teachers could be helped to see that Foods and Nutrition is more than 'stitching and cooking'.

In another related study by Stinnet, Richson, and Olson (2001), the greatest proportion of respondents namely, 67% felt that Foods and Nutrition is a profession primarily for women. This finding supports Scott's statement that majority still view the subject as a woman's profession. This suggests to the entire public that in publicity efforts and in the classroom, there is a need for greater emphasis on the opportunities available to men and the contributions which they can make to the Foods and Nutrition profession.

Review of Related Empirical Studies

Lee and Sulaiman (2018) in a study titled effectiveness of physics practical work on students' academic performances and to compare male and female students' academic performances after the implementation of practical work in experimental group. A quasi-experimental design was used in this study. This study was conducted in a secondary school at Semporna District in Sabah. The experimental group and control group were taught by using practical work and traditional teaching method respectively. The respondents were purposively selected with a total of sixty-six (66) students chosen for the study. The instrument used was a questionnaire validated by two experts with teaching experience more than five (5) years in physics. For the reliability, The Cronbach's Alpha (α) Coefficient obtained was 0.761. Before the treatment, students in both groups showed no significant difference in their academic performances indicating that the group of students is homogenous. Students' academic performances, however, have a statistical difference after the implementation of practical work. Gender analysis was done where male students in experimental group performed better than female students. This is relevant to the present study because practical teaching method lead to students improved performance in practical subject like Foods and Nutrition. It also compared the performance of students based on gender.

Okam and Zakari (2017) study titled impact of laboratory- based teaching strategy on students' attitude and mastery of chemistry concepts. The quasi experimental and control research design as well as a survey design were used. The population consists of one thousand five hundred and ninety-two (1592) SSII chemistry students in all government-owned schools in Katsina Local Government Area of Katsina State. Two schools were randomly selected and served as experimental and control schools. The study adopted the pre-test and post-test control group quasi-experimental design. A total number of 194 SSS II students participated in the study. Physics Achievement Test (PAT) was the main instrument used to collect data from students. Test and retest was used for the reliability of the study. The values of the reliability of the two instruments used in the study ("Chemistry Concepts Achievement Test" and "Students' Attitude Questionnaire in Chemistry") are 0.69 and 0.99 respectively. The data collected were analyzed using descriptive statistics and t-test, using SPSS 15.00 statistical packages at 0.05 level of significance .Finding of the study revealed that students taught using laboratory teaching strategy performed better and showed positive attitudes more than the students taught using lecture method. Similarly, there was no significant difference in the mastery of chemistry concept among the male and female students in the experimental group. The finding further revealed that female students within the experimental group demonstrated higher interest than their male counterparts. It was also found that laboratory teaching method was more effective and therefore science teachers should teach students the skills for investigation rather than telling them facts in chemistry. This is relevant to the present study because practical based strategy of teaching would lead to students improved performance in practical subject like Foods and Nutrition.

Etiubon and Udoh (2017) investigated the effects of practical activities and manual on science students' academic performance on solubility in Uruan Local Education Authority of

Akwa Ibom State. The study design adopted for the study was non- randomized pretest – posttest experimental design in two intact classes. The study adopted pretest, posttest non randomized quasi experimental design. Three research questions and three hypotheses were formulated to guide the study. One hundred and four (104) science students from the population of two thousand, nine hundred and fifty (2, 950) senior secondary two in 2015/2016 academic session formed the sample size using simple random sampling technique. Instrument for data collection was a 20- multiple-choice-test item on the concept of solubility. The instrument was validated by three experienced secondary school science teachers of over 10 years teaching experience and by three lecturers from the department of science education and test and measurement unit of the University of Uyo, Uyo. Kuder Richardson formular was used in determining the reliability of the instrument was which 0.80. The research questions were answered using mean and standard deviation while the hypotheses were tested using Analysis of Covariance (ANCOVA). The findings of the study showed that students taught solubility with practical activities performed equally with their counterparts taught the same concept with practical manual. Results also showed that gender had no significant influence on the students' mean performance scores when taught solubility with practical activities and practical manual. It is relevant to this study, because it touches on the importance of practical instruction on student performance.

Saurabh , Jayashree and Prashant (2016) investigated a study titled knowledge and food hygiene practices among food handlers in food establishments. The population is all the food handlers in given area like Suraram, Shapur, Jeedimetla, Gajulramaram, Chintal and Gandimaisamma were contacted. . A cross-sectional survey design was used. A total of 86 questionnaires were administered to food handlers in food establishments and were also interviewed within the stipulated time. The Cronbach alpha statistic was used to test for

internal consistency which gave a value of 0.72. Food handlers with poor personal hygiene and lack of awareness of important issues in preventing food borne diseases, working in food establishments could be potential sources of infections of many intestinal helminthes of protozoa and enterogenic pathogens. The objective of the study was to procure information about various food handling practices and spread awareness about the prevention of food borne diseases. Organization based cross-sectional study. All the food handlers in given area like Suraram, Shapur, Jeedimetla, Gajulramaram, Chintal and Gandimaisamma were contacted. A total of 86 food handlers in food establishments were interviewed within the stipulated time. The required data is obtained by per designed questionnaire method; the data collection involves the following criteria – Food handling practices, environmental and personal hygiene, knowledge of food hygiene and safety and also their attitude, measures taken for controlling and preventing of food borne illnesses, incidence of food borne diseases. Proportions and Chi square test were used for analysis of the data. Results: It was found that maximum food handlers were not certified in food training (82.5%). Only 27.9% of food handlers reported that they heard about food borne diseases. That is they were aware that food can be a source of infection if not handled properly. Awareness or knowledge was better in females (36.8%) compared to males (25.3%). Majority of food handlers acquired their knowledge through mass media. It is seen that overall the attitude of food handlers towards handling of food was satisfactory. In the present study, it was found that all practices related to food hygiene were very well followed by majority of the food handlers in the study. It is important to this study because it enriches the literature of the study on good hygiene, good food safety knowledge and practices.

Nora, Anushree and Amit (2016) investigated a study titled knowledge of food safety and food handling practices amongst food handlers in the Republic of Ireland. A total of 1069

participants from all over the Republic of Ireland contributed to the survey. The study was a survey design and the instrument used in data collection was questionnaire. Content validity was used to validate the instrument by two experts. The Cronbach alpha statistic reliability test was 0.82. Results showed that the residents of Ireland overall had an average level on knowledge of food safety practices (67.0% passing rate). They had an average level of knowledge in food storage (52.8% passing rate), usage and maintenance of the kitchen facilities (59.0% passing rate), and personal hygiene (61.0% passing rate). Conversely, they had a critically low level of knowledge in food handling (10.8% passing rate) and food poisoning (20.1% passing rate). The results of the present study also showed that, the level of knowledge of food safety practices varies amongst the residents based upon their gender, age, place of residence, education level, and marital status, while no significant difference in the knowledge level was observed based upon their per capita income. The study thus, highlights that there is scope for improvement for the residents to advance their knowledge of food safety practices. It is relevant to the current study because it touches handling practices, although the study was not on students.

Olutola, Daramola and Bamidele (2016) investigated a study titled comparative effects of practical and alternative to practical methods on students' academic performance in Biology in Ilorin, Nigeria. The pretest–posttest quasi quasi experimental design was used. The population of the study consisted of two senior secondary schools (SSS) in Ilorin metropolis randomly chosen and intact science class of SSS 3 in each of the chosen school was selected for the study. A total of sixty-six (66) Form Four students participated in this research; thirty-two (32) students were assigned to experimental group and thirty-four (34) students to control group. The experimental group and control group were taught by using practical work and traditional teaching method respectively. The instrument used was

questionnaire. The researchers' designed Biology Practical Test 1 (BPT 1) and Biology Practical Test 2 (BPT 2) with Cronbach's alpha reliability coefficient of 0.73 (Pre-test) and 0.82 (Post-test) were used to obtain data for the study. Data on students' academic performances were analysed by using Statistical Package for Social Science (SPSS) Version 22.0 and Mann-Whitney U Test was used. Findings revealed that there is a significant effect of practical methods on secondary school students' performance in Biology. In addition, there is no significant effect of gender on students' academic performance in Biology and there is no significant interactive effect of gender subject combinations and practical methods on students' performance in Biology. This is relevant to the present study because practical knowledge would lead to students improved performance in practical subject like Foods and Nutrition.

Agbo, Ahmed, Alhaji and Auta (2016) study titled the level of application of practical activities in learning science concepts in integrated science in the secondary schools in Gombe metropolis, it also find out the problems that militate against the successful application of practical activities in learning science concepts. The study was guided by five research questions and one hypothesis. The study adopted a quasi experimental research design and consists of the control and experimental group in determining the effect of practical activities on students' academic achievement, the control group received no treatment while the experimental group was taught for a period of two weeks employing practical activities. The population of the study comprised all the available Integrated Science teachers and all students in junior secondary schools in Gombe Metropolis while the sample of the study was made up of a total of 80 junior secondary school students from the JSS 2. Also a questionnaire was designed for the teachers, to get their opinion about practical activities in learning science concepts as test was administered to the students to determine

the difference in the academic achievement of students taught employing practical activities and those taught with the conventional method. The validity and reliability of the instruments were determined, the content validity was done by three experts in the department of Educational Foundation of the University of Jos, whereas the reliability of the instrument was determined using the Kuder-Richardson K-21 formula and the reliability was found to be 0.81. The SPSS was used for the statistical analysis of Pearson Product moment correlation coefficient and the study made the following findings, practical activities in learning science concepts increases students achievement in science, spurs their motivation for learning and makes learning more meaningful as theories are concretized. This is relevant to the present study because practical knowledge would lead to students improved performance in practical subject like Foods and Nutrition.

Muriungi (2016) investigated a study titled household's knowledge, attitude and food handling practices, consumption of traditional fermented milk and risk factors for adult overweight and obesity in Isiolo central sub county. y. A cross-sectional survey was carried out among households in an emerging peri-urban town in the Northern part of Kenya in January 2016. A two stage multicluster sampling was used to select 5 Sub-locations and 25 villages from the sampling frame. A pretested semi structured interview questionnaire was used to collect data from 423 households. The questionnaires were standardized based on experiences from the pre-test. The reliability result from test and retest was 0.68. The study found households that did not produce traditional fermented milk scored highly on the knowledge and practices items related to food handling compared to households that produced traditional fermented milk. Further analysis on the socio-demographic characteristics associated with knowledge, attitude and practices on food handling showed significant association between age, gender, residency and the educational status of study

adults. This is relevant to the present study because practical instructions on food handling practice improves students knowledge and attitude food safety and it covers food handling practices which is part of the current study.

Mwangi, and Kibui (2015) investigated a study, titled effect of chemistry practicals on students' performance in chemistry in public secondary schools of Machakos and Nairobi counties in Kenya. The research was conducted using quasi experimental of the pre- test – post test design. Multi-stage cluster sampling and purposive sampling were used to obtain a sample of 735 Form Two students from 24 public secondary schools in Machakos and Nairobi counties for this study. The students' performance in chemistry was determined from scores obtained by students in Students Achievement Tests (SATs) done just before and immediately after exposure to the topic under investigation. The SATs was standardized by experts. The Spearman–Brown prophecy formula. The scale has a reliability coefficient of 0.69. Descriptive and inferential statistics such as the mean and independent t-test were used to discuss the research findings. The study found that there is a positive relationship between the use of chemistry practicals and learners' performance in chemistry. The results of the study indicate that the students had comparable performance in chemistry before treatment; that the performance of the students taught using chemistry practicals improved after the treatment; and that there was a significant difference in performance in the post test between the experimental and control groups. This is relevant to the present study because practical instruction would lead to students improved performance in examinations and also same quasi experimental design was used.

Omiko (2015) in a study titled, laboratory teaching: implication on students' achievement in chemistry in secondary schools in Ebonyi state and Ufondu (2009), the role of the laboratory on the academic achievement of students in biology in Abakaliki education

zone of Ebonyi state, were of the same opinion where they observed that laboratory teaching is sometimes used in conjunction with large lecture courses so that students may acquire technical skills and apply concepts and theories presented in the lecture. Omiko (2015) in the study, aimed at investigating the roles of the laboratory in students' academic achievement in chemistry in secondary schools in Ebonyi State of Nigeria. Descriptive survey research design was used. Four research questions and two hypotheses guided the study. The population of the study consisted of all the chemistry students in the secondary schools in the 212 Government owned secondary schools in Ebonyi State. A sample of 240 students selected through simple random sampling technique from ten secondary schools in the 3 Education Zones in Ebonyi State was used for the study. A questionnaire instrument developed by the researcher was used for data collection. The instrument was validated by three experts one from measurement and evaluation and the other two from chemistry education. Test of reliability was done using Cronbach Alpha-statistic. A reliability coefficient of 0.80 was obtained. The data collected were analyzed using mean and standard deviation statistics. t-test was used in testing the hypotheses. The results showed that the use of the laboratory helps to: develop scientific attitudes in the students towards the learning of chemistry especially practicals, develop scientific skills for problem solving in students among others. He also stated that "hands-on experience encourages students to develop a spirit of inquiry and allows them to acquire scientific skills and the right attitude to handle scientific tools and materials. Science laboratory provides students with the richest experiences which they will transfer to the society and their various places of work. It helps in providing the students the opportunities to practice science as the scientist do. In order for the laboratory to be effective, students need to understand not only how to do the experiment, but why the experiment is worth doing, and what purpose it serves for better understanding of a concept, relation, or process.

Based on the roles of the science laboratory in science teaching and learning, it implies that schools without laboratories would end up producing or graduating students who will have no knowledge of science practicals required by the West African Examination Council (WAEC) and the National Examination Council (NECO) to pass the senior school certificate examination. Consequently, these students will lack the requisite requirement qualification for courses like medicine, engineering, agricultural science and any of the science related careers. This is relevant to the present study because practical knowledge would lead to students improved performance in food handling practices and development of skill in the subject matter.

Muchai (2012) explored a study titled effects of practical work on students' achievements in Physics at secondary school level in Murang'a East Sub-County. The study used a quasi-experimental pretest-posttest design. The study targeted 9820 students in 31 public secondary schools of Murang'a East Sub-County. A pilot study was undertaken for purposes of validation and testing the reliability of the research instrument that was used. Content and construct validity was used. The reliability of the assessment test was determined using the split-half method. A reliability coefficient of 0.83 and 0.87 were obtained for the Pre-test and posttest tests respectively. It comprised four mixed secondary schools purposely sampled; two experimental groups and two control groups. The main units of analysis were the 188 (sample size) Form 2 students of the four purposively sampled mixed day secondary schools. All the four groups were exposed to the pretest. The experimental groups were taught using the practical approach for one term while the control groups were taught using the traditional method. The study used four instruments namely: A pretest physics achievements test, physics attitudinal scale, an observation checklist and post-test physics achievements test. The study concluded that, practical instructional approach towards physics

is an effective teaching method which physics teachers should be encouraged to use to enhance students' achievements in the subject. This is relevant to the present study because practical instruction is equally used in this study. It is equally relevant to the study because it is based on quasi-experimental design but does not deal on skill acquisition.

Mojca, Silvestra, and Peter, (2008) conducted a study titled food safety knowledge and practices among pregnant and non pregnant woman in Slovenia with 291 pregnant women and 200 non-pregnant women found that the women lacked food safety knowledge and safe food handling practices, hand washing practices and hygienic practices in home kitchen. The study used a survey design method. Both interview and questionnaire were used. The Cronbach alpha statistic was used to test for internal consistency which gave a value of 0.69. They consume meals at fast food restaurants. They do not possess adequate knowledge to check best before date, do not pay attention to hygienic conditions in stores and they do not wash their hands before and after cooking and consuming food. They concluded that to achieve global food safety, it is necessary to inform consumers, especially vulnerable groups, about fundamental principles of food safety assurance at home, since food safety begins in the home of the consumers. It important to this study because good food safety knowledge and practices among students will enable them to perform better after school.

Brewer, Sprouls, and Craig (2004) studied consumer attitudes toward food safety issues. The objectives of their study were to survey consumer attitudes about the safety of the food supply in general, then relate general concern levels with groups of specific items of concern, regulatory issues, and prioritization of food safety funding areas. It was a survey design. The instrument used was questionnaire. Factor analysis of 419 consumer responses showed six factors (chemical, health, spoilage, and regulatory issues, deceptive practices, and ideal situations) and the population of the study is 1250. The instrument has a reliability of

0.71. They suggested that while consumers might have relatively high levels of concern about food safety is an issue, they were not overly concerned about the different measures to increase foods safety. This is relevant to the present study by demonstration of different food handling practices, students are aware of different measure to food safety

Knight, Jackson, Bain, and Eldemise–Sheares, (2003) study, titled household food safety awareness of selected urban consumers in Jamaica. The study used a survey design and 110 randomly selected householders representing three distinct socio-economic groups in North Central St Andrew, an urban community in Jamaica, were conducted during January-March 1999. The population of the study is 1050. The objectives of the study were to determine the household awareness of safe food handling, risk perception, food handling practices and attitude to food safety issues. The instrument used was the questionnaire. The reliability value was 0.78. Majority of respondents reported a fairly high knowledge of safe food handling practices; however, more than one-half were unfamiliar with the correct procedure for freezing and thawing of foods. Householders were very concerned about the food they purchased for preparation at home, displayed strong concerns about sanitation of food handling establishments, food handlers' practices, and the appearance of foods purchased. The majority of respondents had never contacted their local Health Department or the Ministry of Health regarding food safety concerns. Diarrhea, stomach pain, vomiting and nausea were reported as the major symptoms of food-borne illness, while animal foods including dairy, beef, chicken, pork and fish/shellfish were implicated as the main source of food borne illnesses. There were no significant differences ($P < 0.5$) observed between gender and socio-economic groups in the study, except for concern of the appearance of food and shopping options, respectively. These findings raise concerns about consumer food safety

knowledge and practices in Jamaica. It is relevant to this study because it covers handling practices but did not emphasis on skill practice and development.

Summary of Reviewed Literature

In summary, this chapter reviewed literature related to Foods and Nutrition Practical Demonstration Instructional Method and student's food handling practices. The literature reviewed the concept of Home Economics and Foods and Nutrition. It explained Home Economics as a broad spectrum that comprises various branches of studies of which foods and nutrition is one. In the review, Foods and Nutrition Practical was stressed as the focus of students' food handling practices and Foods and Nutrition curriculum at secondary school level, with emphasis on practical work to enable the students become active participants in order to acquire and develop better skills. The theoretical framework of the study was based on the theory of Dave's Psychomotor Domain Taxonomy of learning which hinges on the five stages of Practical learning, namely: Imitation, Manipulation, Precision, Articulation, and Naturalization.

A number of empirical studies related to secondary school student's food handling practices were reviewed. However, most of the empirical studies reviewed showed that most students do not have appropriate food handling practices (poor hygiene and skill development).

Foods and Nutrition is a science subject in vocational education that requires practical instructions just like other science subjects. The gap in the study is that research on Practical Demonstration Instructional Method has not been carried out in schools in Benin Metropolis especially in Egor and Oredo local government areas of Edo State. Despite the works done by

different researchers on handling practices, none to the best of researcher' knowledge had attached importance to Foods and Nutrition Practical Instructional Method of teaching food handling practicals to students in Senior Secondary Schools. Observation from analysis showed that most of the studies on Practical Instructional Method were on science subjects Physics, Chemistry and Biology, none was done on Foods and Nutrition as it relates to practicals. Therefore this study tried to bridge the gap by proposing the use of Practical Demonstration Instructional Method rather than the conventional teaching Methods during practicals to improve secondary school students' hygiene practices and proper handling of tools and equipment in food preparations (handling practices). Thus, the study tried to provide more information on Foods and Nutrition to teachers and Secondary School Students on the need for Practical Instructional Method for teaching and allowing improvisation where there are lack of equipment and tools to arouse students' interest in practicals where they will appreciate and see their hand works. Where students are allowed to participate in Foods and Nutrition practicals in schools, they will develop more skills and be active in class. This will make students to be regular in practical classes and will also help the male students to feel free beyond gender bias to offer Foods and Nutrition as a subject or career as far as the benefits are concerned.

CHAPTER THREE

METHODOLOGY

This chapter present the method used in this study, under the following sub-headings:

- Design of the Study
- Population of the Study
- Sample and Sampling Technique
- Research Instrument
- Validity of the Instrument
- Reliability of the Instrument
- Treatment Procedure
- Control of Extraneous Variables
- Method of Data Collection
- Method of Data Analysis

Design of the Study

The study used the quasi- experimental non randomized design in which there was pre-test, post test, groups. The design involved two groups; the experimental (treatment)

group and control groups (using conventional method) and there were pre-test and post test observation tests for both groups. Quasi- experimental design was used because there was no room for randomization (Ofoegbu, 2011). Therefore, intact classes were used for both (experimental and control) groups to avoid disruption of normal class lessons and other activities of the school programme. The variables of the study are: Practical Instructional and Conventional Methods (independent variables), food handling practices (dependent variable), gender/sex (intervening variable).

The design for this study is therefore illustrated and represented symbolically as follows:

	Pre-test	Treatment	Post-test
Experimental (Practical Method)	O ₁	X ₁	O ₂
Control (Conventional method)	O ₁	X ₂	O ₂

Where :

O₁ = Pre-test

O₂ = Post-test

X₁ = Treatment -Practical Demonstration Instructional Method

X₂ = Usual treatment (Conventional Method).

Population of the Study

The population of the study consisted of 115 (Edo State Ministry of Education, (2019) SS11 Foods and Nutrition students in public mixed secondary schools in Egor and Oredo local government areas in Benin Metropolis. These two schools were chosen out of the 8 public mixed secondary schools in Benin Metropolis because they have things in common (more male students offering F/N than in other school).

Table 1 shows the population distribution of students offering Foods and Nutrition.

Table 1: Population Distribution of Students Offering Foods and Nutrition

S/N	Name of School	Male	Female	Total
Egor L.G.A				
1	Asoro Grammar School	3	14	17
2	Eweka Grammar School	10	20	30
3	Evbareke Secondary School	2	7	9
4	Uselu Secondary School	2	6	8
5	Uwelu Secondary School	2	8	10
Oredo L.G.A				
6	Akenzua II Secondary School	1	10	11
7	Ihogbe Secondary School	6	12	18
8	Oba Ewuare Secondary School	2	10	12
Total		28	87	115

Source: Edo State Ministry of Education (2019)

Sample and Sampling Technique

The sample size of the study was forty-eight (48) SSII Foods and Nutrition students in two secondary schools that were purposively selected out of the eight (8) co-educational Secondary Schools in Benin Metropolis offering Foods and Nutrition. The two schools were selected from Egor and Oredo LGAs respectively which are Eweka and Ihogbe Secondary Schools because these two schools have more male students offering Foods and Nutrition. Eweka Secondary School has 30 SSII students offering Foods and Nutrition, that is 10 males and 20 female students. Ihogbe College has 18 SSII students offering Foods and Nutrition with 6 male students and 12 female students. The 18 students in Ihogbe College were used as experimental group and the 30 students from Eweka secondary school were used as control group and both were intact classes.

Table 2: Sample size of the Study

S/N	Name of School	Group	Male	Female	Total
Egor L.G.A					
1	Eweka Grammar School	Control	10	20	30
Oredo L.G.A					
2	Ihogbe Secondary School	Experimental	6	12	18
Total			16	32	48

Research Instrument

The instruments used for data collection were a standardized West African Examination Certificate (WAEC) Practical past question to assess practical works (Appendix 5) and an adapted WAEC and National Business and Technical Examination Board (NABTEB) scale. It contained a 4 point likert scale for 45 observable behavioural items,

which assessed students' Psychomotor skills with the following modified likert scale ratings: very good =4, Good=3. Fair =2 and poor =1 (Appendices 3& 4).

Validity of the Instrument

The instrument checklist which was adapted from WAEC and NABTEB for Foods and Nutrition was validated by the supervisors and two experts, one in measurement and evaluation and the other in Foods and Nutrition both in university of Benin. They made some observations and suggestions to increase the number of items from (30 to 45) which were corrected by the researcher to suit the purpose of the study.

Reliability of the Instrument

In establishing the reliability of the instrument that was used for this study, copies of the research instrument were given to the food and nutrition teacher in Asoro Secondary School in Egor LGA, Edo State to assess twenty (20) Foods and Nutrition students who were part of the population but outside the selected sample. Data were collected and analyzed using Cronbach alpha statistics of internal consistency. The result showed r- value of 0.79 which means that there is consistency in the instrument.

Treatment Procedure

The researcher obtained permission from the school authorities in the Secondary Schools concerned for the involvement of the teachers, students and facilities. The researcher briefed the two groups of Foods and Nutrition teachers on the researcher's intended work with the students before the commencement of the treatment for the experimental and control groups. The students in the experimental group were guided by the researcher using Practical Demonstration Instructional Method as they carried out the practical exercise while those in

the control group were taught directly by the regular teacher using lecture (conventional) method

Phase 1: Pre-treatment Assessment (First Week): The students' knowledge of handling practices were first observed on both experimental and control groups before the commencement of the treatment. The pre-treatment assessment instrument is made up of 4 rating scales and 45 items were used to observe psychomotor skills and behaviour of the students during practical classes. The assessment was done on the two groups (Practical Demonstration Instructional (experimental) Method and Conventional (control) Method, with the help of the regular teacher who had been briefed on the procedure to be used within the first week.

Phase 2: Treatment Package: The researcher prepared four weeks lesson notes for the control group using the conventional lecture method and another four weeks lesson notes for the Practical Demonstration Instructional (experimental method group) Method group (Appendices 6 and 7). The lesson notes were used to teach the students for four weeks (weeks 2 – 5) covering the four selected practical topics. The Foods and Nutrition teacher in the control group the students using conventional method while the researcher taught the students in the experimental group using Practical Demonstration Instructional Method. The teacher in the control group was briefed and observed during the lesson.

Phase 3: Post-treatment Assessment (The Sixth Week): At the end of the six weeks of treatment, the same assessment instrument was reshuffled for use by the researcher (experimental group) and the regular Foods and Nutrition teacher in

the control group for the post test assessment of students' practical. At the end, each group had two sets of scores; pre-test assessment scores and post-test assessment scores.

Control of Extraneous Variables

Extraneous variables are nuisance variables that must be controlled to avoid bias.

For this study, the extraneous variables were:

1. **Time between pretest and post- test:** The time between pre-test and post-test if too long, there could be the influence of forgetfulness. To avoid this influence, the researcher conducted the post-test immediately after the treatment. The short period will help to control the pre-test sensitization.
2. **Teachers' variable:** Teachers' variable may affect the outcome of the research in quasi experimental study. The teachers' variable could occur if the same teacher was made to teach the experimental and control groups, the teacher may notice the differences between the two groups, this may cause one group being at an advantage position than the other.
3. **Experimental bias:** the researcher did not teach the two groups to avoid bias. The conventional method group was taught by the regular Foods and Nutrition teacher in the school under the supervision of the researcher while the experimental group was taught by the researcher.
4. **Students' interaction:** Using students in one school for both experimental and control groups could cause students sensitization as their interaction could be that they are being used for research purpose. The study therefore, chose two intact classes from two different schools.

5. **Duration of teaching:** For the purpose of this study, the duration was six weeks and the normal periods of the lesson per week was used that is double periods of 45 minutes each per week. The first (week 1) and last (week 6) weeks were used for Pre-test assessment and Post-test assessment respectively while the remaining four weeks (weeks 2-5). To control this variable therefore, both groups were taught within the same length of time. If one group was taught for a longer period, the students will have advantage over the second group in terms of skills and knowledge that could be gained.

Method of Data Collection

The data collection were through checklist (rating) scale assessment sheets which were given to the control group teacher and the others for the experimental group were used by the researcher before and after commencement of the treatment.

Method of Data Analysis

Data were analysed using frequency distribution and percentage for research questions 1 and 2, with decision rule on students score of below 50%, is regarded as low hygiene knowledge; 50-69% taken as moderate hygiene knowledge, while 70% and above was taken as high hygiene knowledge. Paired sample t-test was used to test hypothesis 1 testing at 0.05 alpha level of significance. When the p-value was less than the alpha value of 0.05, the null hypothesis was rejected, otherwise accepted when p-value was higher or equal to 0.05.

Hypotheses 2 and 3 were tested with t-test of independent sample and tested at 0.05 level of significance. Where p-value was less than the alpha value of 0.05, the null hypothesis was rejected, otherwise accepted, where p-value was higher or equal to 0.05.

Hypothesis 4, was tested with two way ANCOVA and tested at 0.05 level of significance. Where p-value was less than the alpha value of 0.05, the null hypothesis was rejected, otherwise accepted where p-value was higher or equal to 0.05.

CHAPTER FOUR

PRESENTATION OF RESULTS AND DISCUSSION OF FINDINGS

The focus in this chapter was the presentation of results based on the data collected and analysed, as well as the discussion of findings

Presentation of Result

The data analysed are presented in the following tables based on research questions and hypotheses:

Research Question1: What is the level of knowledge on hygiene of food handling practices of students before Foods and Nutrition Practical Demonstration Instructional Method?

Table 3: Level of knowledge of hygiene on food handling practices

Level of Hygiene knowledge	N	%
Low	29	60.4
Moderate	15	31.3
High	4	8.3
Total	48	100

N = 48

Table 3 shows that out of 48 participants observed in Foods and Nutrition practical class, 29 of them had low level of hygiene knowledge in food handling practices before Foods and Nutrition Practical Instructional Method. This accounts for 60.4%.of participants that scored below 50%, 15 participants which accounted for 31.3% of the total students scored between 50 and 69 which is moderate level of hygiene knowledge in food handling practices and 4 out

of the total participants which accounted for 8.3% of the students scored 70% and above which is high level of hygiene knowledge in food handling practices.

Research Question 2: What is the level of knowledge on hygiene of food handling practices among male and female students?

Table 4: Level of knowledge of food handling practices among male and female students

Level of Hygiene	No of Female	%	No of Male	%
knowledge				
Low	18	56.25	11	68.75
Moderate	11	34.38	4	25
High	3	9.38	1	6.25
Total	32	100	16	100

N = 48

Table 4 showed that they were 32 females and 16 males were observed in food handling practices before the introduction of Practical Demonstration Instructional Method. It was observed that 18 females and 11 males which accounted for 56% and 68.75% out of the total of 32 females and 16 males scored below 50% which means low level of hygiene knowledge. 11 females and 4 males which accounted for 34.38% and 25% respectively scored between 50 and 69% meaning moderate level of hygiene knowledge in food handling practices. 3 females and 1 males which accounted for 9.38% and 6.25% of students, meaning those who scored 70% and above with high level of hygiene knowledge. Therefore, those with high level of hygiene knowledge are very few while those with low level of hygiene are more with few moderate level of hygiene knowledge.

Hypothesis 1: There is no significant difference between the pre-test and post-test mean scores of students taught food handling practice with practical instructional method

N = 18

Tables 5: Paired sample t-test of experimental group in food handling practices

Test	Mean	Std deviation	t-value	Sig	Decision
				2 tailed	
Pretest	66.69	11.73			
			-5.954	0.000	rejected
Posttest	84.02	7.42			
$\alpha=0.05$					

Table 5 showed the paired sampled t-test of the experimental group in food handling practices at pre-test and post-test. The table showed a t-value of -5.954 and a p-value of 0.000, testing at an alpha level of 0.05, the p-value is less than the alpha level. So the null hypothesis which states that “there is no significant difference in the pre-test and post-test mean scores in students food handling practices before and after students were exposed to Foods and Nutrition Practical Instructional Method” is rejected. Therefore, there is a significant difference in the pre-test and post-test mean scores of students food handling practices before and after students were exposed to Foods and Nutrition Practical Instructional Method. Since the mean score of post-test is higher than the mean score of pre-test, it shows that the practical instruction is effective.

Hypothesis 2: There is no significant difference between the post- test mean scores of the experimental and control groups on food handling practices.

Table 6: t-test of independent samples on students' food handling practices at pre- test

Group	N	Mean	Std deviation	t-value	Sig	Decision
					2 tailed	
experimental	18	66.69	11.73			
				9.238	0.000	Rejected
control	30	45.61	3.51			
$\alpha=0.05$						

Table 6 showed the t-test of independent sample on students' food handling practices of both the experimental and control groups at pre-test. The table showed a t-value of 9.238 and a p-value of 0.000, testing at 0.05 alpha level of significance. The p-value is less than the alpha level. So there is a significant difference at pre-test between the experimental and control groups. So the null hypothesis, which says that “ there is no significant difference between the post-test mean scores on food handling practices of the experimental and control groups is rejected. Hence, the need for Analysis of Covariance (ANCOVA) at post-test; with pre-test as covariate.

Table 7: Mean and standard deviation of students' food handling practices treatment at post-test.

Group	No of students	Mean ($\bar{x}$)	Std deviation
Experimental	18	84.02	7.42
Control	30	63.14	3.03

Table 7 showed descriptive statistics of mean and standard deviation of student's food handling practice treatment scores at post-test of both experimental and control groups. The table showed a mean of 84.02 and a standard deviation of 7.42 for the experimental group at post test and a mean of 63.14 and standard deviation of 3.03 for the control group at post test.

Table 8: One way ANCOVA of students food handling practices at post-test.

Source	Type III sum of square	Df	Mean Square	F-stat	Sig	Decision
Corrected model	5027.999 ³	2	2513.999	104.571	0.000	
Intercept	3194.056	1	3194.056	132.859	0.000	
Pretest	120.676	1	120.676	5.020	0.030	
Group	1062.946	1	1062.946	44.214	0.000	rejected
Error	1081.845	45	24.041			
Total	247864.890	48				
Corrected total	6109.843	47				

$\alpha=0.05$

Table 8 showed One-way analysis of covariance (ANCOVA) of students' food handling practices treatment scores at post-test of experimental and control groups. The table showed *F-statistic value* of 44.214 and a *p-value* of 0.000 testing at an alpha level of 0.05. The p –

value is less than the alpha level of 0.05. Thus, the null hypothesis which states that “there is no significant difference between the post test scores of the experimental and control groups in students’ food handling practices” was rejected. Therefore, there is a significant difference in the post test scores of the experimental and control groups in students’ food handling practices. Since the mean of the experimental group was greater than that of the control group, it means that treatment was more effective with experimental group than the control group.

Hypothesis 3: There is no significant difference between the post-test mean scores of male and female students in the experimental group on food handling practices.

Table 9: t-test of independent sample on students food handling practices of post-test by gender

Sex	No of students	Mean	Std deviation	t-value	Sig 2 tailed	Decision
Male	6	79.48	7.18			
				-1.987	0.064	Retained
Female	12	86.29	6.70			

$\alpha=0.05$

Table 9 showed a t-test of independent sample of students’ food handling practices of the experimental group by gender at post test. The table showed a t-value of -1.987 and a p-value of 0.064, tested at an alpha level of 0.05. The p-value is greater than the alpha level of 0.05. This showed that there was no significant difference in the posttest scores of the male and females students in food handling practices, thus, the null hypothesis which stated there is no significant difference in the post-test scores in students’ food handling practices of male and

female students in the experimental group is retained. Meaning that the Foods and Nutrition Practical demonstration instructional method is effective for both sexes.

Hypothesis 4: There is no significant interaction effect between treatment method and male and female on students' food handling practices

Table 10: showed a mean and standard deviation of male and female students handling practices at post - test

Group	Gender	Mean	Std deviation	N
experimental	male	79.48	7.18	6
	female	86.29	6.70	12
Control,	male	59.39	1.30	10
	female	65.01	1.45	20

$\alpha=0.05$

Table 10 showed a mean and standard deviation of the male and female students in the experimental and control groups. A breakdown of the result showed that under the experimental group, the males had a mean of 79.48 and standard deviation of 7.18, while the females had a mean of 86.29 and standard deviation of 6.70 at post-test. The mean score of male was less than that of the female but with a slightly higher standard deviation than the female. Under the control group, the males had a mean of 59.39 and standard deviation of 1.30, while the females had a mean of 65.01 and standard deviation of 1.45 at post-test. The female had higher mean and standard deviation value than the male. The table showed that the male and female in the experimental group out scored their counterpart in the control

group. To determine if there was an interaction between treatment and gender on food handling practices scores based on group and gender, ANCOVA statistic was used to test hypothesis four as shown on table eleven

Table 11: Two-way ANCOVA of treatment by gender interaction effect on students food handling practices

Source	Type III sum of square	Df	Mean($\bar{x}$) square	f-stat	Sig	decision
Corrected model	5314.650	4	1328.662	71.847	0.000	
Intercept	3463.557	1	3463.557	187.292	0.000	
Pretest	11.351	1	11.351	.641	0.438	
Group	1261.061	1	1261.061	68.192	0.000	
Sex	280.992	1	280.992	15.195	0.000	
Group Sex	3.117	1	3.117	.169	0.683	retained
Error	795.193	43	18.493			
Total	247864.890	48				
Corrected total	6109.843	47				
$\alpha=0.05$						

Table 11 showed the interaction effect between treatment and gender on food handling practices scores of students. The table showed F-value of 0.169 and p-value of 0.683; tested at an alpha level of 0.05. From the table, p-value was greater than the alpha level, so the null hypothesis which stated that there is no significant interaction effect of treatment by gender on students' food handling practices is retained. This means that the treatment was effective irrespective of the gender of the students.

Discussion of Findings

The study examined the effect of Foods and Nutrition Practical Instructional Method on students food handling practice of in secondary schools in Benin metropolis, Edo state, Nigeria. The findings revealed that out of the 48 SS11 Foods and Nutrition students observed in practical class before being exposed to Foods and Nutrition Practical Instructional Method, 19 (39.58%) of the participants had little hygiene knowledge. This was an indication that students generally have poor food handling practices which had been identified as leading case of majority of the foodborne diseases, because they did not place importance on hand washing when handling foods. This may be due to lack awareness. Nigusse and Kumie (2012) supported the findings and pointed out that food handlers with poor personal hygiene and lack of awareness of important issues in preventing food borne disease and working in food establishment could be potential source of infections of many intestinal helminthes of protozoa and enterogenic pathogens. On the contrary, Williams (2001) is not in support of this findings because he remarked that mishandling and disregard for food hygiene measures on the part of the food handlers may result in food contamination and its consequences such as food poisoning and other food related diseases(typhoid and cholera). Thus, he remarked that proper food handling and preparation is an important aspect of nutrition and community health that require attention. Result also revealed that 5 out of 16 male students and 14 out of the 32 female students in the study had little knowledge of hygiene in food handling practices before being exposed to Foods and Nutrition practical instructions. This accounts for 31.25% and 43.75% of male and female students respectively who had hygiene knowledge before being exposed to Foods and Nutrition Practical Instructional Method. It is obvious that there is a gender gap in Foods and Nutrition as a subject hence, there are a variety of theories as to

why male students lose interest in Foods and Nutrition, such as parental influence, blame on the teachers and societal influence (Williams 2001). Although many parents, educationists and the society are taking great strides to create equity in all areas of life especially in areas of education and work force for male and female. This finding is in-line with Miller, (2004) as to why boys may want courses that are more task oriented than girls. In this findings also, the percentage of female is higher than that of the male students because more female students use to offer Foods and Nutrition as a subject and most of these female students were with their mothers or most of the time with their mothers in the kitchen.

The curious and observable one will want to do everything as their mothers do, such as washing hands and equipment before use in the kitchen. The females learnt these habits from home because they were always in the kitchen with their mothers. This is in-line with Okorie and Ezeji (2008) who stated that some parents are not guiding their male children well to develop interest in the study of Foods and Nutrition. Hence, Okoh (2006) observed that girls are more involved than male in home domestic work or activities; so there is every good evidence that female students will have good hygiene than male students. However, APU (2008) is not in support of this, instead emphasized that parents should guide and educate male children on the importance of foods and nutrition in societal building. These male students should be encouraged to offer Foods and Nutrition as a subject.

Result revealed that there was a significant difference in the pre-test and post-test scores in food handling practices before and after students were exposed to foods and nutrition practical instructions. This finding is in agreement with Mankilik (2011) who stated that practical approach means any teaching and learning activity which involves at some point the students (Learner) observing or manipulating real objects and materials. Polma (2000) remarked that teaching without practicals will not enhance active learning and

participation. This statement shows the importance of practical in learning. The findings is also in line with the work of El-rabadi (2013) who said that the teaching objectives can be achieved easily by doing practical work. The study of Lee and Suliaman (2018) showed that there was a significant difference in the effectiveness of Physics practical on academic performances, after implementation of practical work which is in-line with this finding.

Also, the result revealed that there was a difference in the post-test scores of experimental and control groups in food handling practices. It means that Foods and Nutrition practical instruction is effective in teaching handling practices. The finding is in line with Okam and Zakari (2017) in their study on impact of laboratory based teaching strategy on students attitude and mastery of Chemistry concepts. The study revealed that students taught using laboratory teaching strategy performed better and also that laboratory teaching method is more effective. It is clear that Foods and Nutrition practical instruments on handling practices is more effective in enhancing students handling practices and preferred to lecture /conventional teaching method. Also, Mwangi and Kibui (2015) supported this study's findings by observing that students exposed to practical method perform better than those taught with conventional method. This goes to show that there is a positive relationship between practical and learners' handling practices because of the opportunity of touching and manipulating materials and apparatus which is applicable to Foods and Nutrition instructions method. Also, Adesoji and Olatunbosun (2008) supported the findings of this study as they found that practical work influences and improves students handling performance as they can easily recall what they see and touch rather than just listening. On the contrary, the findings of their study was not supported by Kahle (1992), who noted that schools are only as good as their teachers, regardless of how high their standard, or up-to-date their technology or innovative their programmes are. Students still look up to their teachers before they could carry out any practical.

The result from the study also revealed that there is no significant difference between male and female students' scores of the experimental groups in food handling practices. This implies that both male and female students equally benefitted from the use of practical instructions. This shows that the method is not sex biased. This shows that male can also favorably compete in a profession traditionally dominated by females. This is supported by Etibon and Udoh (2017) who showed that gender has no significant influence on student performance taught solubility with practical activities. It means that both the male and female students perform well in Foods and Nutrition practical using practical instruction method. This is not in agreement with findings of Stinnet, Richson and Oloson (2001), and Scott (2009) in their studies where they observed that, Foods and Nutrition is still viewed as a female profession. Similarly, Lee and Sulaiman (2018) found that gender has no influence on students' Physics practical work. Also in support of this study is Okam and Zakari (2017) in their study on impact of laboratory based teaching strategy on students' attitude and mastery of Chemistry concepts. To them, gender has no influence rather they found that there was no significant difference in the mastery of Chemistry concepts among the male and female students in the experimental group.

Result from this study revealed that there is no significant treatment by sex interaction effect on student's food handling practice. This means that the treatment is effective irrespective of the sex of students. This is in-line with Etiubon and Udoh (2017) who found that gender has no significant influence on the students' mean performance scores when taught solubility with practical activities. However, this study disagrees with findings of Okam and Zakari (2017) in their study, where they revealed that female students within the experimental group, demonstrated higher interest than the male counterpart. It shows that there was a significant treatment by sex interaction effect on students' food handling

practices. This result is supported by Olutola, Daramola and Bamidele (2016) who reported that there is no significant effect of gender on students academic performance in Biology and there is no significant interactive effect of gender based on subject combinations and practical method on students performance in Biology. Also the study found that sex has no significant interaction effect on treatment in teaching and Nutrition. This study is also supported by Knight, Jackson, Bain and Eldemise-Sheares(2003 Foods) who found that no significant difference was observed in gender and socio-economic group in the study of household food and safety awareness of selected urban consumers in Jamaica.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents the summary, conclusion and recommendation of the study based on the findings.

Summary

The study examined the effect of Foods and Nutrition practical demonstration instructional methods on students' food handling practices in secondary schools in Benin metropolis, Edo state, Nigeria. Six research questions were raised and four hypotheses formulated and tested at alpha level of 0.05. The design adopted for the study was quasi - experimental non randomized intact class group design. The sample size for the study consisted of forty eight (48) SSII Foods and Nutrition students in two senior secondary schools sampled from eight (8) mixed secondary schools in Benin metropolis.

The instruments used for data collection were Foods and Nutrition West African Examination Council (WAEC) past practical paper I question and a checklist which was adapted from WAEC and National Business and Technical Education Board (NABTEB) Foods and Nutrition. The duration for the study was six (6) weeks. The researcher taught the experimental group with foods and nutrition practical demonstration instructional method while the regular Foods and Nutrition teacher taught the control group using lecture method. The researchers lesson notes were used using the same topic while the control group teacher was briefed on how to carry out the teaching. The students were observed on food handling practices using checklist for both experimental and control groups to collect data before the commencement of the treatment (pre-test scores). At the end of the treatment, a post-test and delayed observation on handling practices (reshuffled) for both experimental and control

group were done and data were collected (post test scores). Using the data collected, the research questions were answered with percentages while the hypotheses were analysed and tested using paired sample t-test, t-test of independent sample and Analysis of Covariance (ANCOVA). All hypotheses were tested at 0.05 alpha level of significance. The findings of the study include;

- Out of the 48 SSII Foods and Nutrition students observed on food handling practices during practical before treatment (Foods and Nutrition Practical Instructional Method) 39.58% of the participants had little knowledge of hygiene in food handling practices.
- There was a gender difference in the level of knowledge on hygiene as male students scores lower (31.25%) than the female scores (43.75%), although they both had little knowledge.
- There was no significant interaction effect by gender on treatment of students on food handling practices.
- The Foods and Nutrition Practical Instruction Method was effective for the experimental group.

Conclusion

Based on the findings of this study, the conclusion was drawn that the students have little knowledge of hygiene, the female students are better on the level of knowledge on hygiene than the male students, the Foods and Nutrition Practical Instructional method helped students to acquire better knowledge in hygiene and food handling practices. This is based on the facts that the method would make foods and nutrition teachers to adequately plan and prepare lessons that would guarantee learning by students because they will be involved and

be active in class. Also, the Practical Instructional Method was very effective on the experimental group than those taught with conventional method. Finally, the treatment was effective irrespective of the gender of students.

Recommendations

The following recommendations' were made based on the findings of this study

1. Foods and Nutrition practical Instructional method, has the potential of positively influencing Foods and Nutrition students food handling practice, therefore it is recommended that Foods and Nutrition teachers should engage in the use practical oriented instruction methods like the Practical Instructional Method. This could be done by revealing practical in struction during seminars and workshops.
2. There should be provision facilities for practical lessons in foods and nutrition for more practicals.
3. The method has the tendency of increasing students handling practices proficiency. It is recommended that students should be properly trained to acquire the skills in handling practices and be encouraged to apply it.
4. Foods and Nutrition should also be encouraged in single sex schools (boys especially)
5. There should be regular cooking competitions in-order to increase students' proficiency in handling practices.
6. Policy makers should make Foods and Nutrition compulsory in all public secondary schools in the Federation.

Curriculum planners should include F/N in the senior secondary school, grouping among

the compulsory subjects in school.

Inspectorate division should make it a mandate to be sending their representatives to schools to monitor the use of equipment provided to schools by the teacher and students.

Contribution to Knowledge

The findings of this study have contributed to knowledge in the following ways:

- (1) The study has established that Practical Instructional method has helped students to improve on food handling practices irrespective of gender.
- (2) The study has helped to provide empirical data on students' food handling practices in secondary schools in Edo State.
- (3) The study has established that Practical Instructional Method is an effective method for teaching Food and Nutrition Practicals in Secondary Schools in Edo State.
- (4) The study showed that Practical Instructional Method has made students to better their hygiene practices during Food and Nutrition Practicals in Secondary Schools in Edo State.

Suggestions for Further Studies

Based on the scope and findings of the study, it was further suggested that:

- Similar study using Practical Instructional Methods should be carried out in other local government areas in Edo state and possibly other states in Nigeria.
- A study on the evaluation of the teaching facilities used in the teaching and learning of Foods and Nutrition in secondary schools in Edo state be carried out.
- A study on the effect of teachers' qualification on the teaching and learning of Foods and Nutrition in secondary schools in Edo state be embarked upon.

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Appendix 1

**Table 1: Population Distribution of Students Offering Foods and Nutrition in 2019/2020
Academic Session.**

S/N	Name of School	Male	Female	Total
Egor L.G.A				
1	Asoro Grammar School	3	14	17
2	Eweka Grammar School	10	20	30
3	Evbareke Secondary School	2	7	9
4	Uselu Secondary School	2	6	8
5	Uwelu Secondary School	2	8	10
Oredo L.G.A				
6	Akenzua II Secondary School	1	10	11
7	Ihogbe Secondary School	6	12	18
8	Oba Ewuare Secondary School	2	10	12
Total		28	87	115

Source: Edo State Ministry of Education (2019)

Appendix 2

Letter of Identification

UNIVERSITY OF BENIN, BENIN CITY, NIGERIA

DEPARTMENT OF VOCATIONAL & TECHNICAL EDUCATION

FACULTY OF EDUCATION

OFFICE OF THE HEAD OF DEPARTMENT

Our Ref:

Your Ref:



P.M.B. 1154,
Cables & Telegrams: Uniben Benin
Talex: 41365 Uniben NG.
Telephone: (052) 600553, 600556, 600546
600566
Extensions:
E-mail: vte@uniben.edu.ng

18th September, 2018

TO WHOM IT MAY CONCERN

LETTER OF IDENTIFICATION

This is to certify that the bearer GLORIA IFE YINWA BARDI, is a Ph.D student in the department of vocational and Technical Education, Faculty of Education, University of Benin.

She is carrying out a study on the topic *“EFFECT OF FOODS AND NUTRITION PRACTICAL INSTRUCTIONS ON STUDENTS’ FOOD HANDLING PRACTICES IN SENIOR SECONDARY SCHOOLS IN BENIN METROPOLIS, EDO STATE, NIGERIA”*

I wish to request your kind permission to enable her carry out the study/research .

Thanks for your cooperation.

Yours sincerely,


DR. (MRS.) H. A. OLUMESE
Head of Department



Appendix 3

Modified checklist

Please tick the appropriately.

Gender: Male () Female ()

Key: Excellent ==4, Good=3. Fair =2 and poor =1

s/n	Skills/Tasks to be rated in the practical work	4	3	2	1
1	Personal appearance before commencement of work				
2	Choice of equipment and tools to be used				
3	Cleanliness of equipment and tools to be used				
4	Arrangement of equipment and tools before commencement of work				
5	Display of equipment and tools according to functions				
6	Display of ingredients				
7	Availability of measuring instruments				
8	Use of measuring instrument				
9	Correct use of measuring instruments				
10	Measured items arranged according to usage				
11	Materials /quantities of ingredients for each dish				
13	Preparation of the different courses				

14	Preparation according to service				
s/n	Skills/Tasks to be rated in the practical work	4	3	2	1
15	Usage of seasons/flavors to suit what is being prepared				
16	Dishes chosen according to courses				
17	Cleaning of hands at work				
18	Correct use of chopping boards				
19	Number of chopping boards to suit purposes				
20	Reasons for choice of dishes				
21	Checking oneself and timing				
22	Use of correct pots, sauce pans ,etc				
23	Interpretation of choice				
24	Cleanliness and economy				
25	Dovetailing (Ability to do 2 or 3 task with the same period)				
26	Adequate timing				
27	Ability to finish cooking as planned				
28	Ability to prepare cold foods first				
29	Ability to complete cooking within the stated time				

30	Cleaning and clearing				
31	Appearance after practicals				
s/n	Skills/Tasks to be rated in the practical work	4	3	2	1
32	Laying of table				
33	Folding of napkins				
34	Welcoming of teacher/examiner to the table				
35	Introduction of student				
36	Table arrangement and decoration				
37	Presentation of menu cards				
38	Presentation of water and spoon in a clean glass for tasting prepared foods				
39	Presentation of different courses				
40	Suitable snacks and drinks				
41	Speed of service with correct methodology and presentation				
42	Examiner's comments and corrections				
43	Ability to reorganize the table after assessment				
44	Clear the table course by course				
45	Clear and clean up within the given time				

Appendix 4

Observational checklist

[illegible]

APPENDIX 5

WAEC QUESTIONS

KNOWLEDGE OF FOOD AND NUTRITION PRACTICALS

SC 7023
WASSCE SC 2017
FOODS AND
NUTRITION 3
Practical
1 hour + 3 hours

3

Name:

Index Number:

THE WEST AFRICAN EXAMINATIONS COUNCIL

West African Senior School Certificate Examination for School Candidates, 2017

FOODS AND NUTRITION 3

Preparation Time: 1 hour

Practical Examination: 3 hours

SC 2017

PRACTICAL

Instructions to Candidates and Preparation Sheets

1. The test for all candidates is given on the next page.
2. Read the test carefully.
3. During the next 1 hour you must complete this form using the carbon paper provided and so making two copies. When completed, carefully tear out the carbon copy for your own use during the practical examination and hand it with the original to the Examiner.
4. In Section A, give the:
 - (a) dishes chosen;
 - (b) reasons for your choice;
 - (c) quantity of ingredients used for each dish.
5. In Section B, give the total quantity of all ingredients required.
6. In Section C, give a time-plan showing the order of work; do not write out methods.
7. The blank Pages 3 and 4 may be used for rough work.
8. There will be a preparation period of 1 hour before the test begins. In the 3-hour practical examination, you must complete the cooking, serving and washing-up. You will be expected to keep to your time plan.

10074

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Practical :double periods of 45 minutes each

THE WEST AFRICAN EXAMINATION COUNCIL

The West African Senior School Certificate Examination

FOOD AND NUTRITION 1

Preparation Time: 30 minutes

Practical Test: 90 minutes

PRACTICAL 1

Instructions to the students and preparation sheets

1. The test for the students is given on the next page.
2. Read the test carefully
- 3 In section A, give the :
 - a. the dish chosen;
 - b. reasons for your choice;
 - c. quantities of ingredients used for each dish;
2. In section B, give the total quantities of all ingredients required
3. In section C, give a time plan showing order of work; do not write out the methods.
4. There will be preparatory period of 30 minutes before the test begins. In the 90 minutes practical , you will be expected to keep to your time plan

Follow the instruction on the previous page for each week of the practical

Practical Questions

(1) Week 1&2 $\implies$ Using creaming and rubbing – in methods, prepare and serve suitable dishes for two covers.

Wk3 $\implies$ Prepare and serve a suitable one pot dish for a visitor from Lagos .

Wk4 $\implies$ In this festive period prepare a two course meal for two guests using chicken and vegetables with an accompaniment.

Name of Student..... Sex:.....

Section A

Dish chosen	Reasons for choice	Chief ingredients/quantities	Materials/tools

Name of Student..... Sex:.....

Section B

Total quantities of all ingredients

Quantity	Dry stores		Quantity	Fresh foods

Name of Student..... Sex:.....

Section C

Time Plan

Time	Order of work

Appendix. 6

Scheme of work for both experimental and control groups

Foods and Nutrition Practical Scheme of Work

Week	Topic	Objective
1	Method of cake making Creaming method	Students should be able to use bake any cake products using creaming method
2	Rubbing in method	Students should be able to use rubbing in method to produce cake product
3	A-one pot dish	Students should be explain and produce a one pot dish
4	Entertainment of guest	Students should be able to use different meals for festivity

Appendix 7

LESSON PLAN FOR CONVENTIONAL METHOD (CONTROL GROUP) Lesson

Week 1

Name of School: Eweka Secondary School, Benin Technical College Road, Benin City

Topic: Method of Cake making – using creaming method

Class: SSII F&N

Duration: double periods of 45 minutes each

Instructional Objectives: At the end of the lesson period, the students should be able to:

- identify the different tools used for making cake
- measure ingredient correctly
- handle the different tools
- cream cake mixture properly
- bake the cake

Entry Behaviour: Students have eating flour products

Instructional Procedure

Step	Content	Teacher's activity	Students activity
1	Preamble	Divide the class into groups of six	Students stand in groups
2	Assemble tools and equipment	The teacher presents all tools and items needed for the practical	Students touch and pass tools round
3	Personal hygiene	Teacher washes her hand and make sure the students do same and clean all tools and equipment	Students clean the hands and equipment
4	Measuring and sieving the dry ingredients	The teacher demonstrates weighing and sieving of dry ingredients	Students watch with keen interest and attention
5	Creaming method	The teacher demonstrates all the process in creaming method	Students watch and ask questions
6	Greasing of pan and baking	The teacher demonstrates and shows the students how to cream and baking.	Students join in greasing of pans
7	Presentation and serving	The teacher presents the baked products and demonstrates how	Students take a taste of the product

		to serve	
8	Evaluation	Teacher ask some questions	Students give answers to question
	Assignment	Teacher ask students to find out other methods of making cake	

Appendix 8

LESSON PLAN FOR CONVENTIONAL METHOD (CONTROL GROUP) Lesson Week 2

Name of School: Eweka Secondary School, Benin Technical College Road, Benin City

Topic: Rubbing – in method of Cake making

Class: SSII F&N

Duration: double periods of 45 minutes each

Instructional Objectives: At the end of the lesson period, the Students should be able to:

- sieve dry ingredients together
- use their finger tips to rub–in the mixtures
- demonstrate the processes
- prepare some products by rubbing–in method

Entry Behaviour: Students have known how to bake by creaming method

Instructional Procedure

Step	Content	Teacher's activity	Students activity
1	Revision of the previous topic	Teacher asks different groups questions on the previous practical	Students provide answers to questions
2	Measuring and Weighing ingredient	Using measuring tools to measure and weigh ingredients	Students join in weighing and measuring
3	Rubbing – in method	The teacher cleans her hands and tools and demonstrates the processes involved	Students watch with keen interest
4	Creating pastry	The teacher mould the mixture into pastry and make out biscuits or chin-chin, teacher bakes the biscuits or fries the chin-chin	Students watch with keen interest students join in frying
5	Washing and cleaning up	Teacher gather the students to wash and clean	Students participates in cleaning up

		up	
6	Serving of the product	Teacher teaches students how to serve the product (chin-chin and biscuits)	Students taste from the products
	Evaluation	Teacher ask students to describe how to make biscuit by rubbing – in method	Students give answers to questions
	Assignment	Ask students to find out the different methods of cooking	

Appendix 9

LESSON PLAN FOR CONVENTIONAL METHOD (CONTROL GROUP) Lesson Week 3

Name of School: Eweka Secondary School, Benin Technical College Road, Benin City

Topic: Preparing a one pot dish

Class: SSII F&N

Duration: double periods of 45 minutes each

Instructional Objectives: At the end of the lesson period, the students should be able to:

- make use of cutting boards and knives
- prepare beef jollof rice
- set table for the meal
- clear and wash up.

Entry Behaviour: Most of the students have been cooking or assisting their mothers cook at home

Instructional Procedure

Step	Content	Teacher's activity	Students activity
1	Revision	Teacher asks the students questions on previous practical	Students give answers to questions
2	Introduction	The teacher introduces practical for the day and assembles the different food stuffs	Student listen with keen interest
3	Preparation of a one pot dish	The teacher weighs and measure all that are needed, clean and prepare the ingredients for the meals	Students watch with keen interest and join in cleaning
4	Preparation of a one pot dish	Demonstrates and prepare the jollof rice using beef	Students help in plucking, cutting and watching
5	Preparation of a one pot dish	Set table and serve the dish	Students watch and ask questions
6	Preparation of a one pot dish	Shares the food for the students to taste	Students taste the products

7	Evaluation	Ask students reasonable questions on the processes	Students give answers to these questions
	Assignment	Ask the students to find out how to prepare fried rice	

Appendix 10

LESSON PLAN FOR CONVENTIONAL TEACHING METHOD (CONTROL GROUP) Lesson Week 4

Name of School: Eweka Secondary School, Benin Technical College Road, Benin City

Topic: Entertainment of guest (chicken, vegetable, fried rice)

Class: SSII F&N

Duration: double periods of 45 minutes each

Instructional Objectives: At the end of the lesson period, the Students should be able to:

- cut chicken in portions
- use two different chopping boards in cutting chicken and the vegetables
- use the correct sauce pans for frying the chicken and vegetables
- serve food with the accompaniment

Entry Behaviour: The students have been eating different party foods

Instructional Procedure

Step	Content	Teacher's activity	Students activity
	introduction	Display the different food stuff	Students in groups watch with keen interest
2	Introduction of the day's practical	Tell the students the meal to be prepared and necessary ingredients needed	Student pay attention
3	Preparation of the ingredients	Teacher presents all vegetables needed for fried rice	Students watch and ask questions
4	Cleaning of ingredients and washing hands	Teacher asks students to wash their hands and shows students how to wash the vegetable to avoid losing the necessary B and C vitamins (water soluble)	Students wash their hands and help in cleaning the ingredients and watch the teacher demonstrates
5	Preparation	Teacher washes and prepare the chicken, demonstrates cutting of the vegetables	Students watch with keen interest and ask questions
6	Preparation	Teacher prepares the fried	Students answer questions

		rice step b step and asking students questions	and watch the preparation procedures
7	Setting table and presentation of meal	Teacher demonstrates ten formal table setting and present meals	Students watch the formal way of setting table and present of meal
8	Evaluation	Teacher asks the students to mention the ingredients for fried rice	Students answer the questions
	Assignment	Teacher asks the students to clear, clean and wash up	The students clear, clean, wash up and show the teacher

Appendix 11

LESSON PLAN FOR EXPERIMENTAL TEACHING METHOD -WEEK 1

Name of School: Ihogbe College, Benin City

Topic: Cake mixture – Creaming method

Class: SSII F&N

Duration: double periods of 45 minutes each

Instructional Objectives: At the end of the practical lesson, the Students should be able to:

- identify tools to be used
- measure ingredients
- handle tools properly
- operate the cooker

Entry Behaviour: The students have been eating flour products and are familiar with creating new recipe.

Instructional Procedure

The students are shared into groups of four (4)

Instructional Procedure Guideline:

Steps	content	Teacher's activity	Students activity
1	introduction	The teacher briefs students on how to go about their practical and makes sure that they are in different groups..	Students organize themselves in groups with a leader in each group and gather their tools and materials
2	Presentation of the new recipe	The teacher/ researcher inquires about the new recipe	The group leader of each group, presents their menu cards and recipes
3	Preparation of the new menu using developed recipe	The teacher/ researcher moves round to watch assist where necessary	Students together with their group leaders, perform the different tasks in creaming cake mixtures and new recipes. Each student participates in exercise, using their hands and tools.
4	Preparation of the oven or improvisation	The teacher moves closer in case of any mal handling	Students prepare their oven to the desired temperature
5	Baking of the new	The teacher makes sure that the students do not	The students put their mixture in greased pan and put in oven to

	products	burn their products by reminding them to check out what they have in the oven	bake. They occasionally check the oven.
6	Clearing and washing up	The teacher watch the students work in groups	The students clears and wash up all that was used.
7	Presentation of products with their names	Teacher moves round check and access each group's product	The students set tables and present their works.
8	Assignment		The group leaders tells every member of the group what to bring next.

Appendix 12

LESSON PLAN FOR EXPERIMENTAL TEACHING METHOD -WEEK 2

Name of School: Ihogbe College, Benin City

Topic: Cake mixture – Rubbing - in method

Class: SSII F&N

Duration: double periods of 45 minutes each

Instructional Objectives: At the end of the practical lesson, the Students should be able to:

- measure and sieve ingredient together
- use finger tips to rob-in mixtures
- demonstrate the process involved
- prepare product from robbing-in mixture

Entry behaviour: Students have created recipes for creaming method

Instructional Procedure

The students are shared into groups

Instructional Procedure:

steps	content	Teacher's activity	Students activity

1	Preparation of materials and ingredients	Ask students to prepare their material and start work.	Group leaders organizer their students, measure necessary ingredients and sieve dry ingredients together in a bowl.
2	Robbing-in mixture	Teacher moves round to watch and check each group.	With clean hands, the students rob in the mixtures together with their finger tips.
3	Process of robbing in mixture	Ask students questions as they work	Students introduce the new recipes into the mixture and making up the pasteries
4	Preparation of robbing-in mixture	Teacher moves round the different groups to check how the new recipe is been introduced into the mixture.	From the new pastery, the students design what so ever product they want to make.
5	Baking or frying of the product	Teacher watch and assist where necessary	The students fry or bake their products using the correct tools.
6	Setting tables and	Teacher moves round to	Cleaning and

	presentation of products	check and assess students products	washing up, setting the table and serving the robbed-in product.
7	Assignment	Teacher tells students to practice at home.	Students to practice more at home.

Appendix 13

LESSON PLAN FOR EXPERIMENTAL TEACHING METHOD -WEEK 3

Name of School: Ihogbe College, Benin City

Topic: Preparing a one pot dish

Class: SSII F&N

Duration: double periods of 45 minutes each

Instructional Objectives: At the end of the practical period, the students should be able to:

- identify the ingredients for preparing one pot dish
- make use of chopping boards where necessary
- prepare a one pot dish
- set table for the meal
- clear and clean up

Entry behaviour: students are familiar with cooking of different dishes.

Instructional Procedure

steps	Content	Teacher's activity	Students activity
1	Assembling tools and equipment needed	Teacher ask the students to assemble all they need on their tables	Students gather , wash all tools and equipment needed for

			the practical.
2	Preparation	Ask the students to start preparation	Students in their different groups start the preparation by washing, cutting and preparing all ingredients needed
3	Preparation of one pot dish	Goes round to ask questions about what is been prepared	Students in their different groups prepare one pot dish using some food stuff in their locality.
4	Preparation of one pot dish	Teacher watches the different groups to make sure that every one take parts preparation	The group leader assign duty to members of the group.
5	Presentation of one pot dish	Teacher ask any group ready to present their dishes	Cleaning and washing up, setting table and presenting one pot dish
6	Assignment	Ask the students to	Clean and clear the

		clean and clear the environment	environment

Appendix 14

LESSON PLAN FOR EXPERIMENTAL TEACHING METHOD -WEEK 4

Name of School: Ihogbe College, Benin City

Topic: Entertainment with festival food

Class: SSII F&N

Duration: double periods of 45 minutes each

Instructional Objectives: At the end of the practical period, the Students should be able to:

- cut meats into portions
- use two different chopping boards for meats and vegetables
- use correct pots and sauce pans
- prepare any festival food common in their locality
- set tables and serve the meal with any accompaniment

Entry behaviour: Some of the students have been eaten different festive foods while others have ideas of what foods to serve during the festivity.

Instructional Procedure

steps	content	Teacher's activity	Students activity
1	Assemble all tools, equipment and foods required.	Ask students to assemble all materials and tools needed on their tables	Students in their different groups present materials and tools needed

2	preparation	Ask the students to start preparation	Students in different groups start preparation
3	preparation	Moves round to watch students work in their different groups	Students clean, watch, portion meats and wash the different vegetables and prepare all ingredients required.
4	Preparation of festive foods	Moves round to watch and know the names of meals being prepared.	Students in their different groups prepare the different meals for the festivity
5	presentation of the festive food	Assessment of the meals	Students set table tables and present the different festive meals.
6	Assignment	Ask students to clean and wash up tools and material used	clean and wash up tools and material used.

At the end of the fourth week in both control and experimental groups the post test assessment comes up a week after to conclude the field work.

Appendix 15

The test of reliability

Case Processing Summary

		N	%
Cases	Valid	20	100.0
	Excluded ^a	0	.0
	Total	20	100.0

a. Listwise deletion based on all

variables in the procedure.

Reliability Statistics

Cronbach's	
Alpha	N of Items
.793	45

Appendix 16

Data Collected for Pre and Post-Tests

Control Group (Eweka Secondary School)				Experimental Group (Ihogbe College)			
S/N	Sex	Pre-test	Post-test	S/N	Sex	Pre-test	Post-test
1	M	43.8	60.6	1	M	53.9	71
2		36	57	2		62.8	85
3		42.8	60.6	3		62.8	92
4		43	60.6	4		81	82
5		42	58.9	5		37	78.9
6		40.6	60.6	6		75	78
7		42	60	7	F	81.7	82.7
8		42	58.9	8		88.9	91
9		41.7	57.8	9		75	83.9
10		42.8	58.9	10		67	86
11	F	49	62.8	11		70.6	81.7
12		48.9	65.6	12		63	85
13		49	65	13		65	70.6
14		49	63.9	14		63.9	91
15		46.7	64	15		58.9	85
16		49	66.7	16		59	93
17		45.6	67.8	17		72	96.7
18		46.7	66.7	18		63	88.9
19		45	65				

20		44	65				
21		45.6	66				
22		46	62				
23		46	65				
24		52.8	63				
25		46.7	65				
26		46.7	64				
27		47	65				
28		49	65				
29		48.9	66.7				
30		50	66				

Appendix 17

Frequencies

[DataSet1] C:\Users\USER\Documents\Bardi PhD Data Analysis.sav

Statistics

Hygiene practices

N	Valid	48
	Missing	0

Hygiene practices

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 36	1	2.1	2.1	2.1
37	1	2.1	2.1	4.2
40.6	1	2.1	2.1	6.2
41.7	1	2.1	2.1	8.3
42	3	6.2	6.2	14.6
42.8	2	4.2	4.2	18.8

43	1	2.1	2.1	20.8
43.8	1	2.1	2.1	22.9
44	1	2.1	2.1	25.0
45	1	2.1	2.1	27.1
45.6	2	4.2	4.2	31.2
46	2	4.2	4.2	35.4
46.7	4	8.3	8.3	43.8
47	1	2.1	2.1	45.8
48.9	2	4.2	4.2	50.0
49	5	10.4	10.4	60.4
50	1	2.1	2.1	62.5
52.8	1	2.1	2.1	64.6
53.9	1	2.1	2.1	66.7
58.9	1	2.1	2.1	68.8
59	1	2.1	2.1	70.8

62.8	2	4.2	4.2	75.0
63	2	4.2	4.2	79.2
63.9	1	2.1	2.1	81.2
65	1	2.1	2.1	83.3
67	1	2.1	2.1	85.4
70.6	1	2.1	2.1	87.5
72	1	2.1	2.1	89.6
75	2	4.2	4.2	93.8
81	1	2.1	2.1	95.8
81.7	1	2.1	2.1	97.9
88.9	1	2.1	2.1	100.0
Total	48	100.0	100.0	

Frequencies

[DataSet1] C:\Users\USER\Documents\Bardi PhD Data Analysis.sav

Statistics

Hygiene practices

Male	N	Valid	16
		Missing	0
Female	N	Valid	32
		Missing	0

Hygiene practices

Sex			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid	36	1	6.2	6.2	6.2
		37	1	6.2	6.2	12.5
		40.6	1	6.2	6.2	18.8
		41.7	1	6.2	6.2	25.0
		42	3	18.8	18.8	43.8

		42.8	2	12.5	12.5	56.2
		43	1	6.2	6.2	62.5
		43.8	1	6.2	6.2	68.8
		53.9	1	6.2	6.2	75.0
		62.8	2	12.5	12.5	87.5
		75	1	6.2	6.2	93.8
		81	1	6.2	6.2	100.0
		Total	16	100.0	100.0	
Female	Valid	44	1	3.1	3.1	3.1
		45	1	3.1	3.1	6.2
		45.6	2	6.2	6.2	12.5
		46	2	6.2	6.2	18.8
		46.7	4	12.5	12.5	31.2
		47	1	3.1	3.1	34.4
		48.9	2	6.2	6.2	40.6
		49	5	15.6	15.6	56.2

50	1	3.1	3.1	59.4
52.8	1	3.1	3.1	62.5
58.9	1	3.1	3.1	65.6
59	1	3.1	3.1	68.8
63	2	6.2	6.2	75.0
63.9	1	3.1	3.1	78.1
65	1	3.1	3.1	81.2
67	1	3.1	3.1	84.4
70.6	1	3.1	3.1	87.5
72	1	3.1	3.1	90.6
75	1	3.1	3.1	93.8
81.7	1	3.1	3.1	96.9
88.9	1	3.1	3.1	100.0
Total	32	100.0	100.0	

T-Test

[DataSet1] C:\Users\USER\Documents\Bardi PhD Data Analysis.sav

Group = Experimental

Paired Samples Statistics^a

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Pretest	66.6944	18	11.72752	2.76420
Posttest	84.0222	18	7.42354	1.74974

a. Group = Experimental

Paired Samples Correlations^a

	N	Correlation	Sig.
Pair 1 Pretest & Posttest	18	.231	.357

a. Group = Experimental

Paired Samples Test^a

	Paired Differences	T	df	Sig. (2-tailed)

	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1: Pretest - Posttest	-1.73278E1	12.34713	2.91025	-23.46786	-11.18770	-5.954	17	.000

a. Group =

Experimental

Group = Control

Paired Samples Statistics^a

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Pretest	45.6100	30	3.51228	.64125
Posttest	63.1367	30	3.02672	.55260

a. Group = Control

Paired Samples Correlations^a

	N	Correlation	Sig.
Pair 1 Pretest & Posttest	30	.742	.000

a. Group = Control

Paired Samples Test^a

	Paired Differences	t	df	Sig. (2-tailed)

	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1: Pretest - Posttest	-1.75267E1	2.39208	.43673	-18.41988	-16.63345	-40.131	29	.000

a. Group =

Control

T-Test

[DataSet1] C:\Users\USER\Documents\Bardi PhD Data Analysis.sav

Group Statistics

Group	N	Mean	Std. Deviation	Std. Error Mean

Pretest	Experimental	18	66.6944	11.72752	2.76420
	Control	30	45.6100	3.51228	.64125

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2- tailed)	Mean Differen ce	Std. Error Differen ce	95% Confidence Interval of the Difference	
								Lower	Upper
Pret Equal est variances assumed	15.749	.000	9.238	46	.000	21.0844 4	2.28240	16.4902 1	25.6786 8
Equal variances not assumed			7.430	18.84 7	.000	21.0844 4	2.83761	15.1420 0	27.0268 9

Univariate Analysis of Variance

[DataSet1] C:\Users\USER\Documents\Bardi PhD Data Analysis.sav

Between-Subjects Factors

	Value Label	N
Group 1	Experimental	18
2	Control	30

Descriptive Statistics

Dependent Variable: Posttest

Group	Mean	Std. Deviation	N
Experimental	84.0222	7.42354	18
Control	63.1367	3.02672	30
Total	70.9688	11.40161	48

Tests of Between-Subjects Effects

Dependent Variable: Posttest

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5027.999 ^a	2	2513.999	104.571	.000
Intercept	3194.056	1	3194.056	132.859	.000
Pretest	120.676	1	120.676	5.020	.030
Group	1062.946	1	1062.946	44.214	.000
Error	1081.845	45	24.041		
Total	247864.890	48			
Corrected Total	6109.843	47			

a. R Squared = .823 (Adjusted R Squared = .815)

Estimated Marginal Means

Group

Estimates

Dependent Variable: Posttest

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	81.234 ^a	1.698	77.814	84.655
Control	64.810 ^a	1.166	62.462	67.157

a. Covariates appearing in the model are evaluated at the following values: Pretest = 53.5167.

Pairwise Comparisons

Dependent

Variable:Posttest

(I) Group (J) Group	Mean Difference (I-J)	Std. Error	Sig. ^a	95% Confidence Interval for Difference ^a	
				Lower Bound	Upper Bound
Experimental 1 Control	16.425*	2.470	.000	11.450	21.400
Control 1 Experimental	-16.425*	2.470	.000	-21.400	-11.450

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Univariate Tests

Dependent Variable:Posttest

	Sum of Squares	df	Mean Square	F	Sig.
Contrast	1062.946	1	1062.946	44.214	.000
Error	1081.845	45	24.041		

The F tests the effect of Group. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

T-Test

[DataSet1] C:\Users\USER\Documents\Bardi PhD Data Analysis.sav

Group = Experimental

Group Statistics^a

Sex		N	Mean	Std. Deviation	Std. Error Mean
Pretest	Male	6	62.0833	15.63233	6.38187
	Female	12	69.0000	9.16951	2.64701

a. Group = Experimental

Independent Samples Test^a

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2- tailed)	Mean Differen ce	Std. Error Differen ce	95% Confidence Interval of the Difference	
								Lower	Upper
Pret Equal est variances assumed	1.230	.284	- 1.194	16	.250	- 6.91667	5.79160	- 19.1943	5.36098
Equal variances not assumed			- 1.001	6.777	.351	- 6.91667	6.90905	- 23.3635	9.53017

a. Group =

Experimental

T-Test

[DataSet1] C:\Users\USER\Documents\Bardi PhD Data Analysis.sav

Group = Experimental

Group Statistics^a

Sex		N	Mean	Std. Deviation	Std. Error Mean
Posttest	Male	6	79.4833	7.17786	2.93035
	Female	12	86.2917	6.70027	1.93420

a. Group = Experimental

Independent Samples Test^a

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2- tailed)	Mean Differen ce	Std. Error Differen ce	95% Confidence Interval of the Difference	
								Lower	Upper
Postt Equal est variances assumed	.005	.946	- 1.987	16	.064	- 6.80833	3.42655	- 14.0722 8	.45562

Equal									
variances not			-	9.487	.083	-	3.51114	14.6893	1.07265
assumed		1.939				6.80833		2	

a. Group =

Experimental

Univariate Analysis of Variance

[DataSet1] C:\Users\USER\Documents\Bardi PhD Data Analysis.sav

Between-Subjects Factors

		Value Label	N
Group	1	Experimental	18
	2	Control	30
Sex	1	Male	16
	2	Female	32

Descriptive Statistics

Dependent Variable: Posttest

Group	Sex	Mean	Std. Deviation	N

Experimental	Male	79.4833	7.17786	6
	Female	86.2917	6.70027	12
	Total	84.0222	7.42354	18
Control	Male	59.3900	1.29910	10
	Female	65.0100	1.44946	20
	Total	63.1367	3.02672	30
Total	Male	66.9250	10.91430	16
	Female	72.9906	11.26022	32
	Total	70.9688	11.40161	48

Tests of Between-Subjects Effects

Dependent Variable: Posttest

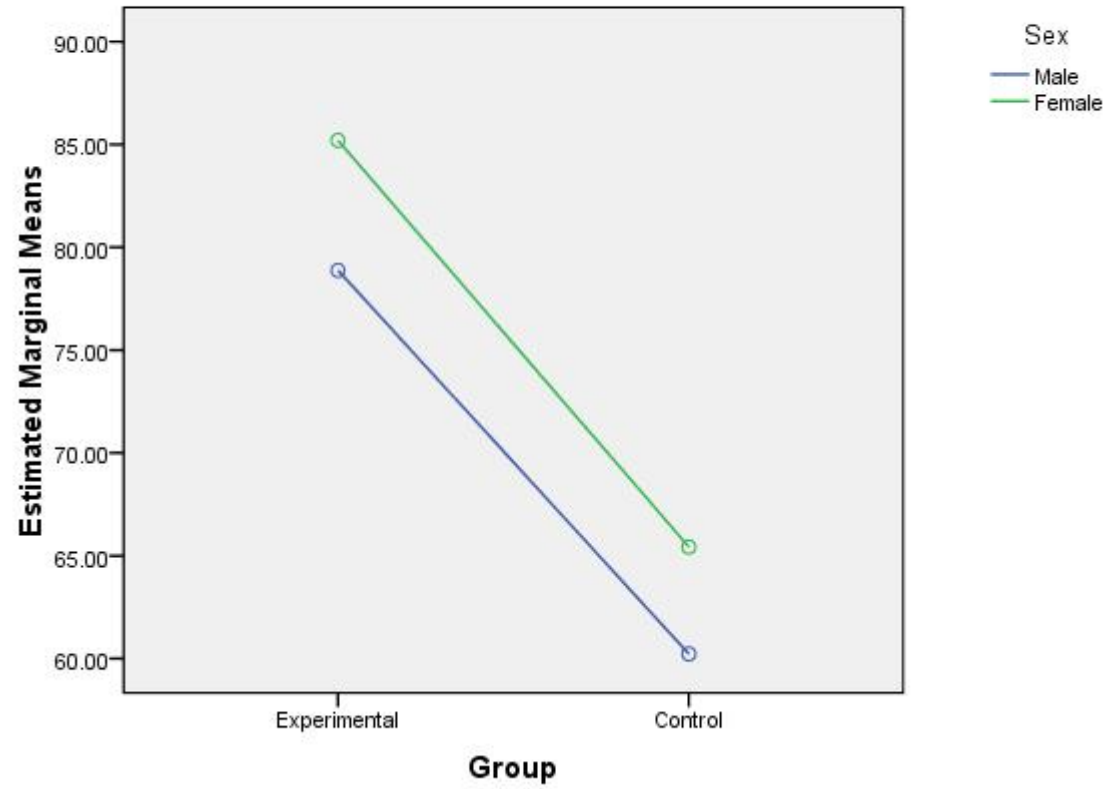
Source	Type III Sum of Squares	df	Mean Square	F	Sig.

Corrected Model	5314.650 ^a	4	1328.662	71.847	.000
Intercept	3463.557	1	3463.557	187.292	.000
Pretest	11.351	1	11.351	.614	.438
Group	1261.061	1	1261.061	68.192	.000
Sex	280.992	1	280.992	15.195	.000
Group * Sex	3.117	1	3.117	.169	.683
Error	795.193	43	18.493		
Total	247864.890	48			
Corrected Total	6109.843	47			

a. R Squared = .870 (Adjusted R Squared = .858)

Profile Plots

Estimated Marginal Means of Posttest



artf

[illegible]

Formula for voting candidates

$$\frac{1}{19} \times \frac{2}{1} = \frac{2}{19}$$

NOTE: X = marks scored by students

N = total marks for entire skill

$$N = 45 \times 4 = 180$$

100 = total mark for practical in percentage

23/12/19

311115331133111111

1200hp 348ci 4100rpm

PRE-TEST ENRICA SENIOR SECONDARY SCHOOL, EGOBORA

20

LINE	DESCRIPTION	AMOUNT	DATE	INITIALS	REMARKS
1	Balance forward	100.00			
2	John Doe	50.00	1/15/20		
3	John Doe	50.00	1/15/20		
4	John Doe	50.00	1/15/20		
5	John Doe	50.00	1/15/20		
6	John Doe	50.00	1/15/20		
7	John Doe	50.00	1/15/20		
8	John Doe	50.00	1/15/20		
9	John Doe	50.00	1/15/20		
10	John Doe	50.00	1/15/20		
11	John Doe	50.00	1/15/20		
12	John Doe	50.00	1/15/20		
13	John Doe	50.00	1/15/20		
14	John Doe	50.00	1/15/20		
15	John Doe	50.00	1/15/20		
16	John Doe	50.00	1/15/20		
17	John Doe	50.00	1/15/20		
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37	John Doe	50.00	1/15/20		
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66	John Doe	50.00	1/15/20		
67	John Doe	50.00	1/15/20		
68	John Doe	50.00	1/15/20		
69	John Doe	50.00	1/15/20		
70	John Doe	50.00	1/15/20		
71	John Doe	50.00	1/15/20		

180

Appendix 18

Chart Showing Internal Temperatures of Cooked Food

Product	Minimum Internal Temperature and Rest Time
Beef, Pork, Veal and Lamb Steaks, Chops, Roasts	62.8°C and allow to rest for at least 3 minutes.
Ground Meats	70°C
Ground Poultry	74°C
Ham, fresh or smoked (uncooked)	63°C and allow to rest for at least 3 minutes.
Fully Cooked Ham (to reheat)	Reheat cooked hams package in USDA inspected plants to 60°C and all others to 74°C.

Product	Minimum Internal Temperature and Rest Time
All Poultry (breast, Whole Bird, Leg, Thighs, Wings, Grounds Poultry, Giblet and Stuffing)	74°C.
Eggs	71°C
Fish and Shell fish	63°C
Left overs	74°C
Casseroles	74°C

Practical Instructional Package (Experimental Group)



Students in groups during practical demonstration class with researcher



Students practicalizing handling practices



A Male Student producing flour product without assistant



The Researcher inspecting students products after handling practices



The researcher corrects the hygienic practices of a student



The researcher talks about the arrangement of the products after handling practices



Students during perfecting handling practices



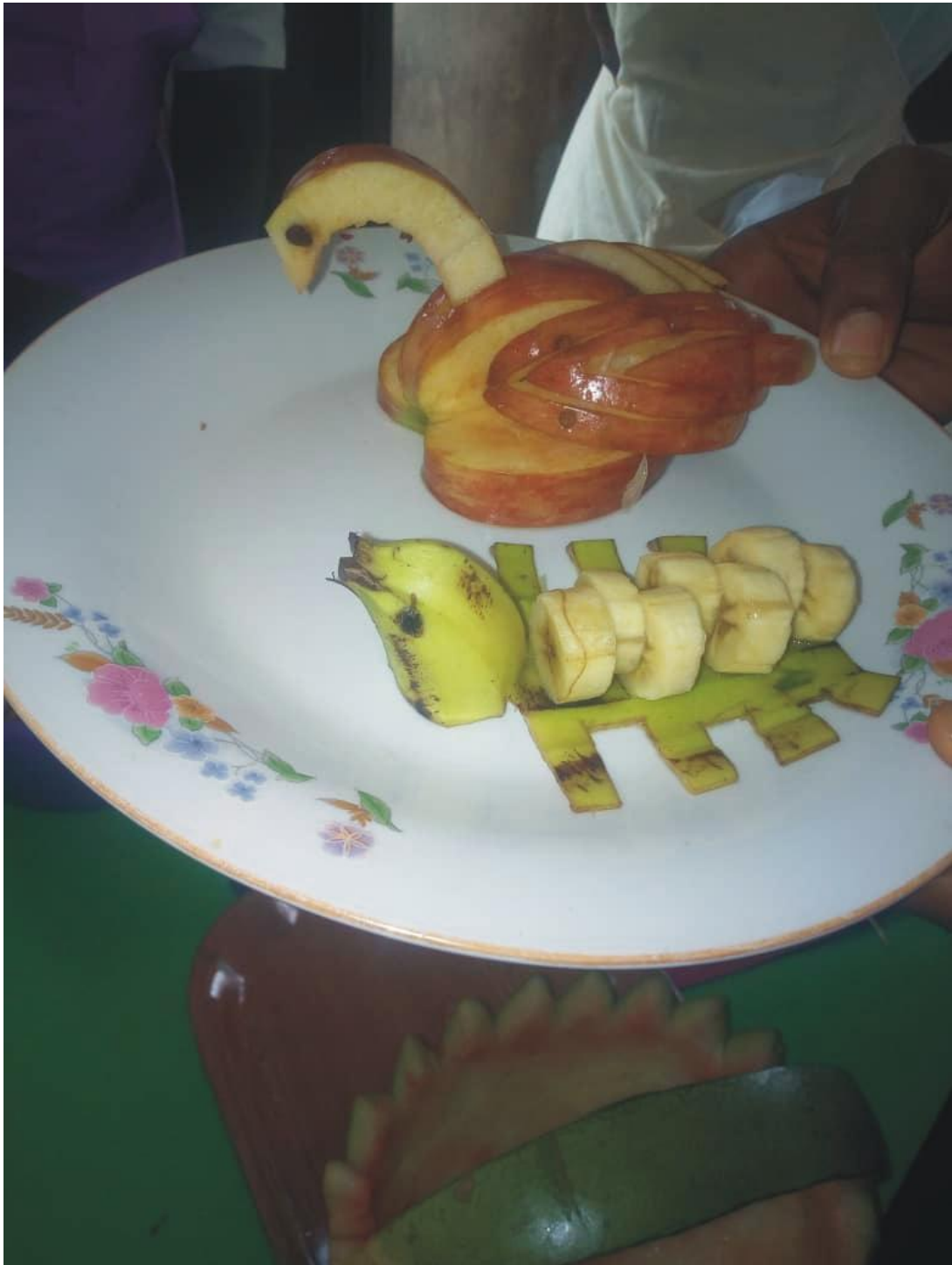
Demonstrating perfection of handling practices



Students display the end product of skills in handling practices



Students develop more skills in handling practices



Skill development by the Students in handling practices



Skill development by the Students in handling practices



The use of apple in developing Skills in handling practices



The end product of students handling practices

CHAPTER ONE

INTRODUCTION

Background to the Study

Observed performance of youths and young adults not being able to handle food preparation in schools especially in most public secondary schools, was linked with the method employed by the Foods and Nutrition teachers in these public schools in teaching Foods and Nutrition especially practicals and the environment which the students were exposed to. It is necessary for the youths and young adults to the role food play in our body and how to handle during meal preparation in order to maintain life and ameliorate problems of food handling practices.

Food is a universal necessity which helps to keep humans in good condition to maintain healthy living and survival. Food could be liquid or solid edibles that provide nourishment and promote growth to the individual. Food could also be regarded as any substance liquid, solid or gaseous state, which when ingested, provides the necessary raw materials for the structure and function of the body, enabling and helping the system to function effectively. Foods are classified into nutrients according to their functions in the body. These include proteins, carbohydrates, fats and oil, vitamins, mineral elements, cellulose/fiber and water. No single food item contains all the nutrients in amounts sufficient to maintain life and promote optimal growth. Man must consume a variety of foods in order to have all the nutrients needed by the body.

Nutrition is the study of the nutrient components in foods and in the body. It is also the study of human behaviour in relation to foods. Medically, nutrition is the scientific process by which the body takes in food and obtains nourishment for the cells, tissues, organs, and systems. It is a process by which an individual ingests, absorb, transports utilizes food substances and excretes food waste (Okoeidion, 2012). The knowledge of nutrition has led nutritionists to understand the value and importance of the nutrients in nutritious and balanced diets. Good hygienic measures must be taken to save the nutrients from unhealthy

condition and disease causing agents (micro-organisms) during preparation and cooking. When foods are contaminated by microbes, they may be transferred to already preserved food by dirty hands, cooking tools like chopping boards and clothes which could result in food poisoning. Food can be a source of poison and food nutrients may also be lost by effect of excessive heat or water depending on the way they are handled and treated. Poor treatment of food can destroy the nutrients and when this happens the nutrients become depleted. Example is leaving fruits and vegetables in water for a long time or when vegetables are over cooked (heated).

Foods and Nutrition is a major part of Home Economics that addresses issues involving diet related concepts, health, food choices, meal planning, preparation and serving. Foods and Nutrition curricula emphasize much of practicals to enhance students' active participation in class, to be able to maintain hygiene and handling practices including skill development among others. Students in Senior Secondary Schools, are expected to be guided in practical activities involving best food handling practices by Foods and Nutrition (F&N) teachers since they are future food handlers. They need the abilities and skills to prepare themselves for the future especially those who want to develop a career in Foods and Nutrition. Research has showed that Foods and Nutrition students lack some of the basic knowledge in food handling. Norazmir in Sanlier (2010) asserted that in food preparation knowledge and practice, that students generally have poor handling qualities however, female students were observed to have higher practices in preparation compared to their male counterparts. In terms of knowledge of handling practices, male and female students are at the same level. This may be due to lack of interest on the part of the male students because they were not exposed early enough to handling equipment during practicals. It may also be due to insufficient tools and equipment that may not go round the students or may not be in good state. Thus, the teacher

may decide to teach the student by mere explanation (lecture method). Some of the male students may feel that they are wasting their time, and that Foods and Nutrition is perceived as mainly for girls so they try to stay away and leave the work for the girls.

Practical classes in Foods and Nutrition are designed to enhance active students' participation in making food choices, planning, preparation, cooking and serving of nutritious diets including proper food preservation and storage. The importance of practical work is to ensure that students are not only mentally active, but by active participation such that there is an increase students' understanding and motivation to learn (Millar, 2004). Another purpose of practicals is to develop the students' skills in handling practices (both male and female students), and this will make them to be strong and give them opportunities of creating new recipes. These purposes may be hindered by inadequate working materials, equipment and tools and non availability of laboratories where practicals could be held, instead, classrooms may be converted for use. The non availability of materials and inadequacies of cooking tools and equipment can make the subject uninteresting or unattractive to students thereby posing challenges to Foods and Nutrition students.

The teaching of Foods and Nutrition practicals does not require any one particular teaching method, rather a number of teaching methods depending on the topic and instructions given (Mahundi, (2015)). The teaching methods used for Foods and Nutrition practicals include lecture, demonstration, group activity, project method, peer demonstration method, field trip, and others. The predominant teaching method employed by teachers of Foods and Nutrition could be the reason why most students especially males seem not to have interest in Foods and Nutrition practical. Foods and Nutrition teachers, most of the time, tend to use a particular conventional teaching method such as the lecture teaching method in teaching Foods and Nutrition practicals. Lecture teaching method may be used most of the

time by Foods and Nutrition teachers probably because they feel that it is the most suitable and they may not be familiar with other teaching methods where students learn by doing. This is why they tend to rely mostly on convention (lecture) method. In the lecture method, the teacher discusses and explains the topic to the students and later tell them to go and carry out the practicals on their own. This is very common in public Secondary Schools and most students may have forgotten one or two things the teacher had taught using the lecture method. In the lecture method, the teacher assumes the position of knowing it all in the teaching--learning situation, and provides information which he/she feels that the students do not have. The teacher directs (instead of showing and demonstrating to the students step by step with the available tools) while the students are left on their own to do the practicals either with the tools they brought from home or the few manageable ones in the school laboratory. Eyiuche, (2013) in Gatawa, (1990) asserted that the conventional teaching method seems to be the most commonly used in Secondary Schools in Nigeria, and this method of teaching does not guide the development of the students' psycho-motor skills efficiently.

Some merits of the lecture methods include: allowing the students to listen and jot down what is being taught; promoting useful discussion; and could be effective in handling large classes (Osuyi, and Anietor 2018). The major disadvantage is that, it is teacher centered since the students hardly have enough facilities to practice with, therefore, lecture method may not be effective. Other disadvantages may be that lecture method encourages laziness, rote memorization and could kill the interest and attitude of the students in the subject matter, thereby making the students' level of thinking to be shallow, cramming of facts, poor retention and teacher depending on the teacher for stimulation of knowledge. Adeola (2014) asserted that teacher centered method of teaching encourages cramming of facts which are easily forgotten and thus results in students not enjoying the lessons and discourages

intellectual stimulation and discovery. Lecture method will give room for the students to take part in food handling practice, thus the use of Practical Instructional Method (PIM) becomes imperative.

Practical Instructional Method, which is an activity based, puts everyone to work and it is student/teacher centered. The Practical Instructional Method (PIM) is a teaching learning situation where the students observe and manipulate tools and equipment as they watch the teacher's demonstration. The students acquire knowledge practically by doing (El-Rabadi, 2013). All that the students do is to imitate their teacher by moving their hands, equipment and tools the way the teacher teaches and demonstrates until they learn to become perfect and independent. Practical Instructional Method gives room for students' participation in practicals thereby improving the students handling practices and skill development. Adebisi, Babayeju and Gbadebo (2016) asserted that it is very important to expose students to food practicals for skill acquisition. This method gives room for the students to practice more especially what they see and do in their classes. Practical Instructional Method can activate the interest of the male students in taking part in Foods and Nutrition academic classes.

Foods and Nutrition which used to be perceived a female biased has seen the entrance of males offering the course at post Senior Secondary levels of education. According to Lee (2001), gender is an ascribed attribute that socially and biologically differentiate the females from the male folks. It connotes male (boy) or female (girl). Culturally, girls are supposed to have better food handling practices than the males because of their traditional roles in the kitchen (helping their mothers in meal preparations and cleaning up), yet it is not clear if all of them handle foods and tools properly. Although most males may not have enough good food handling practices, but current trends seem to suggest that they practice well in catering

businesses today as they try to compete with females. They all try to improve on their food handling practices.

Food handling practices are ways to maintain hygiene when handling food items, surfaces, tools and equipment and to manipulate these tools and equipment for proper skill development. Food handling practices occur from the point of food purchase through cooking, serving and preserving (Uko-Aviomoh and Nwabah, 2009). This will help the handlers to use good quality foodstuffs for better meal preparation. It is also the food handlers' duty to use clean water, good preservation and best cooking methods in order to retain the food nutrients, and ability of the nutrient to be absorbed properly by the body. The Foods and Nutrition students should therefore be exposed to meal planning and its importance, budgeting and purchasing, preservation and storage, methods of cooking before embarking on practicals proper, so that they will have broader view of food handling practices during meal preparation.

The teaching of Foods and Nutrition practical to students is for active participation, producing good quality product using their hand to manipulate instruments and the development of skills in food handling practices which the Secondary School Students need to possess. The conventional method of teaching Foods and Nutrition practical seem not effective. Therefore, this study tried to address the issue by applying another teaching method.

Statement of the Problem

Foods and nutrition curriculum at the Senior Secondary School level emphasizes practicals to enhance students' active participation in class, and acquisition of skill, good hygiene development and food handling practices among others (Mahundi, 2015 & Norazmir, 2012).

The students are expected to be guided actively through basic instructions by their teachers using the different and suitable teaching methods to make them active participants in practical class, but most of the students as observed by the researcher were found to be lacking behind especially in handling and usage of tools and equipment. The causes of this problem hinged on inadequate materials to work with such as tools, equipment, no laboratory where practical would be done. Therefore the major problem of this study was found to be the predominant use of the conventional method of teaching in teaching Foods and Nutrition practicals in Secondary Schools. This problem if not solved, may lead to a continuous poor enrolment of students in WASSEC and NECO examinations, most students may prefer to offer other subjects rather than Foods and Nutrition. Literature revealed that some researchers tried to solve the problem by mere teacher demonstration method without involving the students participation.

This triggered the researcher therefore, to investigate the effects of Foods and Nutrition Practical Instructional Method on food handling practices in Senior Secondary Schools in Benin Metropolis, Edo State, Nigeria.

Research Questions

The following research questions were raised to guide the study:

7. What is the level of hygiene knowledge on food handling practices of students before Foods and Nutrition Practical Instructional Method?
8. What is the level of hygiene knowledge on food handling practices of male and female students?
9. What is the difference between the pre-test and post-test mean scores of students' taught food handling practices with Foods and Nutrition Practical Instructional Method?

10. What differences occurred between the post-test mean scores of the group taught with Practical Instructional Method (experimental group) and those taught with Conventional Method (control group) on food handling practices?
11. What is the difference between the post-test mean scores of students taught food handling practices with Practical Instructional Method (experimental group)?
12. What is the interaction effect of Practical Instructional Method and gender on students' food handling practices?

Hypotheses

Research Questions 3, 4, 5 and 6 were tested at 0.05 level of significance as hypotheses 1, 2, 3 and 4.

5. There is no significant difference between the pre-test and post-test mean scores of students taught food handling practices with Practical Instructional Method and those taught with conventional method.
6. There is no significant difference between the post-test mean scores of those taught with Practical Instructional Method and those taught conventional method (experimental and control groups) on food handling practices.
7. There is no significant difference between the post-test mean scores of male and female students in the experimental group on food handling practices.
8. There is no significant interaction effect between treatment method and male and female students' food handling practices.

Purpose of the Study

The main purpose of the study was to investigate the effects of Foods and Nutrition Practical Instructional Method on students' food handling practices in Senior Secondary Schools in Benin Metropolis, Edo State, Nigeria. Specifically, the study investigated:

- If the students' level of hygiene knowledge on food handling practices was low, moderate or high for the experimental and control groups before the treatment (Foods and Nutrition Practical Instructional Method) was administered,
- The level of knowledge of hygiene on food handling practices among male and female students in the two groups (the experimental and control groups),
- whether there is a difference in the pre-test and post-test mean scores on students' food handling practices before and after Foods and Nutrition Practical Instructional Method,
- whether there is a difference in the post-test mean scores of the experimental and control groups on food handling practices.
- whether there is a difference in the post-test mean scores on food handling practices of male and female students in the experimental group
- the interaction effect of treatment method between males and females on students' food handling practices

Significance of the Study

The study will be of great benefit to nutritionists, Foods and Nutrition teachers and students, caterers, home makers, food vendors, health educators, education planners, and the

general public if disseminated through seminars, workshops, conferences, publications, and online channels.

The study would help nutritionists, most especially those who teach Foods and Nutrition in Public Secondary Schools to use Practical Instructional Method which stands more effective than the conventional method of teaching as a pedagogical strategy to teach such topics as hygienic handling of foods in Foods and Nutrition lessons. It will make the teachers to be more competent in their teaching and also stand a better way teach best practice for handling food hygienically to teachers and students.

The study will have a beneficial effect on the food preparation and vending enterprises since most of the Secondary School Student of Foods and Nutrition may eventually seek further studies and careers in food industries.

The study would be of benefit to Foods and Nutrition teacher and health educators in pursuit of proper handling and dispensing of food hygienically in the society. It will also develop and improve literature on the best pedagogical practices for Foods and Nutrition (Home Economics inclusive) in the country. This will help Health Educators and Education Planners to include such literature in Foods and Nutrition Curriculum to be used in Secondary School.

The general public and future researchers would find the literature useful and beneficial to themselves.

Scope and Delimitation of the Study

The scope of the study, covered food handling practices in Senior Secondary Schools using the Practical Demonstration Instructional Method of teaching. The ideal class

determined for use was Senior Secondary School II (SSII) Foods and Nutrition as Senior Secondary School I (SS I) is an introductory class and Senior Secondary School III (SS III) was already concluding the session.

The content covered all about food handling practices and manipulative skills of the students in practical classes. The study investigated the effective teaching method for Foods and Nutrition Practicals.

The study was delimited to Egor and Oredo Local Government Areas in Benin Metropolis and two public mixed Senior Secondary Schools were used for the study. This was because only Egor and Oredo mixed Senior Secondary Schools offer Foods and Nutrition out of the three Local Government Areas in Benin Metropolis which included Ikpoba-Okha. Foods and Nutrition is only offered in some Girls Secondary School and not in mixed secondary School in Ikpoba-Okha

Definition of Terms

Practical: Teaching learning process in a laboratory which involves the use of hands and tools to achieve a desired product.

Demonstration: Step by Step process of teaching someone how to make or prepare meal to a finished product.

Conventional method: A teaching method that has been in use for a long time.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter covered the review of related literature and under the following sub-headings:

- Theoretical Framework
- Concept of Home Economics
- Concept of Foods and Nutrition
- Foods and Nutrition Practicals in Secondary Schools
- Food Hygiene and Food Handling Practices
- Importance of Hygiene: Hygiene is a very crucial point in food handling practices
- Facilities for Foods and Nutrition Practicals in Secondary schools
- Gender and Foods and Nutrition Practicals in Secondary schools
- Instructional Methods for Teaching Foods and Nutrition Practical
- Attitude of Secondary School Students towards Foods and Nutrition Practicals
- Review of Related Empirical Studies
- Summary of Reviewed Literature

Theoretical Framework

The Dave's Psychomotor Domain Taxonomy (PDT) of 1970 was used as the theoretical framework for this study. With growth of formalized vocational education, noticeably in the Organisation for Economic Co-operation and Development (OECD) developed economies in the 1950s to the 1970s, attention turned amongst policy makers as to how to codify and measure progressive skills development. These resulted in the development of a number of educational taxonomies for psychomotor

objectives notably those of Simpson (1972), Harrow (1972) and Dave (1969). It is understood that Ravindra Dave was party to Bloom's project team's original 1950s work on the cognitive, affective and psychomotor domains although all three significant contributions have to some extent referenced Bloom's work. Dave (1970) developed five different levels of skills, from the most basic to the most advanced. According to the taxonomy theories, every faculty wants to deliver the best learning for every student and it is good to enhance this with practice (Dave 1970). According to Dave, every discipline requires a tool (s) in pursuit of the goal of the discipline and the degree of increasing proficiency in the deployment of these tool(s) comes from practice as they progress through their studies. His five levels of “skills” represent different degrees of competence in performing a skill. The five levels, in order from most basic to most advanced, are:

6. **Imitation:** Learner watches actions of another person and imitates them. Copy action of another, observe and replicate, watch teacher or trainer and repeat action process or activity. The major actions at this level are to: copy, follow, replicate, repeat and adhere.
7. **Manipulation:** Learner performs actions by memory or by following directions. Reproduce activity from instruction or memory, carryout task from written or verbal instruction. The major actions at this level are to: recreate, build, perform, execute and implement.
8. **Precision:** Learner’s performance becomes more exact. That is learners execute skill reliably, independent of help; perform a task or activity with expertise and to high quality without assistance or instructions; able to demonstrate an activity to other

learners. The major tasks at level are to: demonstrate, complete, show, perfect, calibrate and control.

9. **Articulation:** Learner can perform several skills together in a harmonious manner.

The learner is therefore able to adapt and integrate expertise to satisfy a non standard objective, relate and combine associated activities, develop methods to meet varied novel requirement. The major actions at this level are to: construct, solve, combine, coordinate, integrate, adapt, develop, formulate, modify and master.

10. **Naturalization:** Learner achieves a high level of performance, and actions become natural with little or no thought about them. The actions are now more automated, unconscious mastery of activity and related skills at strategic level. The learner is able to define, aim, approach and use activities to meet strategic need. The major tasks at this level are to: design, specify, manage, invent and project management.

Dave's PDT believes that learning starts from its simplest form (imitation), and progress to a level where the student or learner is able to achieve the highest or accomplish the most complex tasks which is Naturalization. For meaningful learning to take place, learners require to experience and experiment an event by feeling, touching and playing with the objects. This art of experimenting and experiencing is what practical instruction is all about and this is what Dave PDT is all about. The learner progresses from simple imitation/mimicking (copying, replicating, and performing) the ability to display competence in the most complex way (create, design, develop, invent, manage). According to Dave, under imitation, the students/learners watches actions of the teacher or tutor and imitates them. Under this stage which is the first and simplest, the learner/student copy, replicate the actions of the teacher/tutor following observations. At this stage, performance quality is low but this not considered a problem. At the Manipulation stage, the students should be seen

to be able to perform a skill on his/her own after taking lessons from the teacher or tutor. With the instructions given, the students should be able to advance in confidence to practice on his/her own. Precision level, involve the students being able to get close to perfection. At this stage, he/she should be performing a skill with a high degree of precision. Working and reworking is the key word to watch out for at this stage. This is performing the task with little or no assistance. Consistency in exactness become the behavioural action at the Articulation stage. The student tries to be internally consistent in the performance of the act. Also, at this stage, attempts are made to combine a series of skills or activities to meet a novel requirement because of level of confidence and consistency in performance. At the last stage of Dave's PDT, the student should be a master with a great level of performance until it becomes second-nature or natural, without the need to think much about it. This is the Naturalization stage.

Foods and Nutrition is a discipline where with regular experiencing and experimentation with tools and by feeling and touching can cause learner to grow from being a rookie to an expert. According to Adebisi, Babayeju and Gbadebo (2016), indicates that Foods and Nutrition is a practical-oriented subject, taught especially with practice and drill methods of teaching in schools in order to enhance learning among the learners. Therefore, with Dave's taxonomy theory, students can grow from imitation to competence following the steps of Imitation, Manipulation, Precision, Articulation and Naturalization. If Foods and Nutrition students are properly guided on the processes of handling practices through these PDT steps they would not need any other training after school as it is currently observed. Dave's PDT is based on real life experience and experiment will help students to transform knowledge or information into their personal knowledge that they can apply to

different situations. Exposure of Foods and Nutrition students to the practice of food handling techniques definitely will enhance the students' expertise in the field after graduation, and this is the philosophy of Dave's taxonomy. In Dave's PDT, the learner (Foods and Nutrition students) examines learning requirements (imitation) and thinks how to solve a problem in hand. The students do not learn about the content rather they learn about the process to solve the problem by creating, designing, developing, or inventing. At stage of Dave's taxonomy, actual learning has taken place.

Concept of Home Economics

Home Economics, also known as family and consumer sciences, is a field of education, which concerns itself with management and economics of the community and home. Although it was mostly meant for girls and young women in the past, these days, all genders are involved in Home Economics as an academic learning/subject. Other names that are used for this subject are domestic economy, human sciences and home science.

Some researchers have conceptualized Home Economics as the study of human and matter resources affecting homes and families, and the use of these knowledge for the benefit of mankind. The contemporary philosophy of Home Economics is the application of the knowledge from the Pure and Applied Sciences, Social Sciences, Arts and Humanities to develop men and women with fundamental competences in proffering scientific solutions to problems in the use of resources to access and increase information on the facts of life and improve living in the family, the community, nation, and the world at large.

From the definition of the contemporary philosophy of Home Economics it can be observed that Home Economics as a discipline has a broad knowledge base, drawing on Pure Sciences such as Biology; Chemistry; Physics; Mathematics; Applied Sciences such as

Nutrition, Information Technology, Engineering of Home Appliances; and Social Sciences including subjects such as Sociology, Family Living, Human Development and Psychology.

The aims of the Home Economics curriculum are to enable students to:

- be responsible citizens and informed consumers willing to contribute to the well-being of individuals, families and society in terms of meeting basic human needs;
- demonstrate good use of management and organizational skills in handling physical and socio-economic resources for self, family, community and society;
- analyse contextual factors contributing to the well-being of individual, family and society with application of knowledge from the food science and technology group or fashion, textiles and clothing group;
- devise and implement strategies to solve complicated problems in technological contexts, in particular, food / fashion, using a range of appropriate techniques and procedures;
- evaluate critically the impact of social, cultural, economic, scientific and technological developments on the well being of individuals, families and society as a whole; and
- further their studies and lifelong learning in food or fashion-related fields

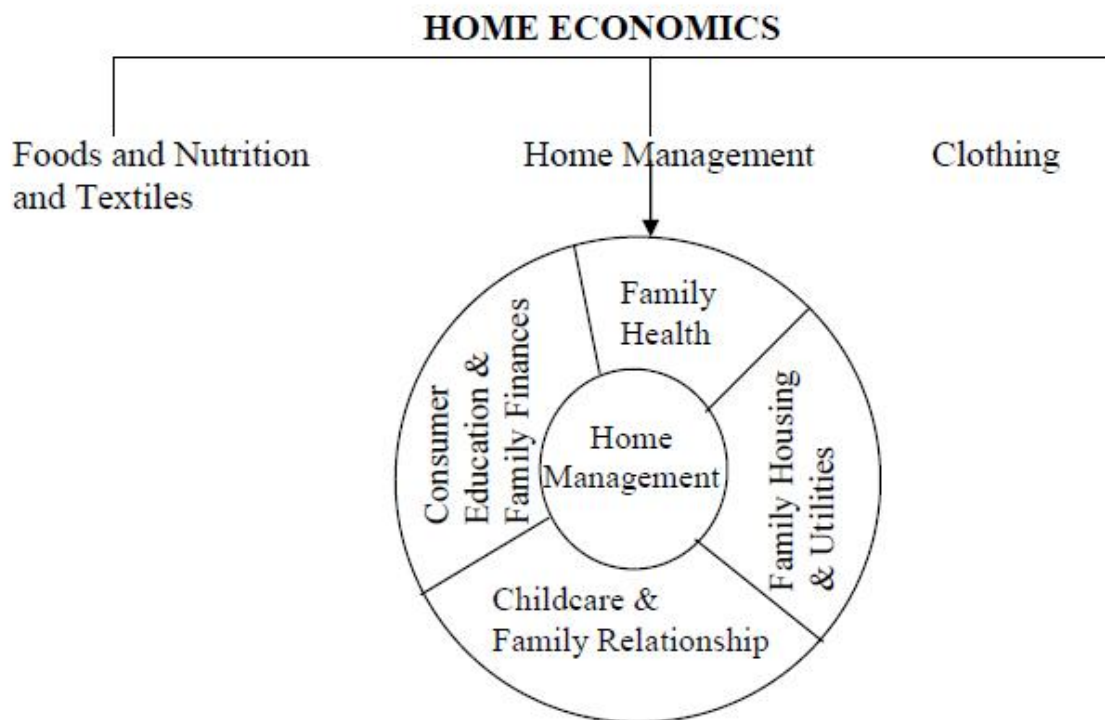


Figure 1: *Scope of Home Economics*

Source: adapted from Anyakaoha and Eluwa (2013)

It is evident that Home Economics is so wide in its scope but already in Scope and delimitation.

Concept of Foods and Nutrition

Nutrition is the process of breaking down food to enable it carry out its various functions or nutrition is the foods we eat and how the body uses it. It is the study of how substances in foods affect our body and health (Ha'ag, 1991). Hence nutrition is seen as food at work in the body. Ihensekihien and Nwabah, (2018) asserted that nutrition is a major, modifiable, and powerful factor in promoting health, preventing and treating diseases and improving quality of life. Food is important because it serves physiological and socio-cultural

purposes. They are quite valuable to human body because they provide energy for its various activities, build up the body and protect it from diseases as well. According to Gordon (2003) nutrition as a science is concerned with the study of the right kind of foods for human beings. Healthy and complete nutrition is something much wider than the mere intake of sufficient foods. (Ha'ag,1991) It requires not only a sufficient and properly balanced diet but also a healthy, receptive and responding body. The science of nutrition is important because what a person eats has a direct influence on how he or she grows, learns and adapt to the physical and emotional stresses of living. In the words of Salami (2018), nutrition is the science that primarily deals with food intake (ingestion) digestion, absorption, transportation and utilization necessary for growth and development as well as general maintenance of life and health and the prevention of disease. In other, it is the act or process of nourishing or being nourished, specifically the sum of processes by which an animal or plant take in and utilizes food substances. The study and practice of nutrition involve a spectrum of other basic and applied scientific disciplines (Molecular Biology, Genetics, Biochemistry, Chemistry, Physics, Food Science and Technology, Microbiology, Physiology, Pathology, Psychology, Immunology, Sociology, Political Science, Anthropology, Communication and Economics). Nutrition is primarily centered on food nutrients and its principles to promote health and wellness, to prevent diseases and/or to restore health in individuals, families, communities and the population at large.

Godman and Grutteridge (2011) defined food as any substance which is taken into the body system in order to enable an organism to grow and maintain its health. Food is anything, either solid or liquid, possessing chemical composition which enables the body when swallowed to do one or more functions in the body. Food can also be seen as a combination of the components - carbohydrates, fats and protein - which our body needs for its normal

function and to provide energy required by the body for physical activities or exercise. Good food is the basis of good health and well being. Food consumption should provide the body with energy, build and protect the body from diseases. According Udoh, (1999) food regulates body functions and keeps them in good working condition. It provides energy required by the body for physical activities and it supplies materials for general growth. Food plays paramount role in one's life and there is a strong correlation between good food and development (Salami & Uko-Aviomoh, (2004).

Salami (2018) saw food as any substance that can be take in and assimilated to enable humans stay alive and grow. Such must be the carrier of nourishment which must be socially and culturally acceptable. According to her, food contains nutrients of various types and contents which she defined as components of food that are indispensable to the body's functioning. They provide energy, serve as building materials, help maintain or repair body parts and support growth. Some of these nutrients include; water, carbohydrate (yam, rice) fat (vegetable oil, margarine among others) dietary fibre (soluble and insoluble fibre) protein (meat, fish and egg), Vitamin (A, B complex and C), Mineral (Calcium , Phosphorous) and Trace elements (iron, manganese , cobalt) (Salami, 2018).

From the definitions above, it can be shown that Foods and Nutrition is the study of the science of food and how the body utilizes foods. Foods and Nutrition is a practical-oriented subject which is taught especially with practice and drill methods in schools in order to enhance learning among the learners. (Adebisi, Babayeju. and Gbadebo , 2016).

Foods and Nutrition is one of the three subjects covered under Home Economics. It is a scientific study of foods and their nutrients (foods and their components) in relation to the body that is fed by the food and the health of the individual. Guthrie and Prociano (2007) highlighted the Foods and Nutrition addresses nurturing or nourishment of the body. Foods

and Nutrition majorly deals with the studying of nutrients and their relationship with foods and living things. Plaxcedia (2015) described Foods and Nutrition as a subject that addresses issues involving understanding of diet related concepts, health, food choices and food processing as well as meal planning.

Foods and Nutrition Practicals in Secondary Schools

Foods and Nutrition aims to equip students with the knowledge, skills and values that will help them to make appropriate lifestyle choices. Studying Foods and Nutrition equips young people to make healthy choices, shop wisely and become independent members of society.

The skills, knowledge and understanding developed through studying Foods and Nutrition in secondary schools are important in today's society, where:

- Many people rely on ready-made meals;
- Obesity is an increasing problem; and
- Diet - related illness is prevalent.

Students have the opportunity to explore these issues in context, leading them to develop a range of transferable and cross-curricular skills. As schools develop their Foods and Nutrition Curriculum, pupils should have opportunities to learn about:

- Healthy Eating;
- Home and Family Life; and
- Independent Living.

Foods and Nutrition as a practical subject can promote and enhance the well-being of individuals, families and communities through understanding food choice, nutritional health, consumer issues and relationships.

As part of learning for life and work, Foods and Nutrition contributes directly to by helping to develop young people as:

- Individuals
 - by creating opportunities for them to explore their health in practical ways, helping to increase their potential to live a healthy life and to make responsible choices about their diet;
- Contributors to society
 - by giving them a sense of themselves and how they relate to one another as social beings;
 - by making them aware of values and lifestyles that are different from their own and helping them make reasoned judgements in family relationships; and
- contributors to the economy and the environment
 - by providing awareness of themselves as consumers in a changing economy, helping them become discerning and effective when making judgments about issues such as the environment and personal finances. (Black 2007).

According to Foster (2007) Foods and Nutrition is a practical subject to study. Students should take part in practical activities within a given topic. Practical activities allow students to consider their own diet and health. The subject ensures that students learn practical aspects of food preparation, hygiene and food safety. As students practice different methods of food preparation they will develop their ability to select and use methods appropriate to the recipe and type of food they are preparing. They will also gain practical experience in using familiar and unfamiliar utensils and equipment.

Food Hygiene and Food Handling Practices

Hygiene can be described as an act of cleanliness, a means of healthy living, to be free from germs and diseases. Health consciousness is synonymous with hygiene consciousness

(Uko-Aviomoh and Nwabah, 2009). People should also note that some foods are more hospitable to microbial growth than others. So they pose a potential health hazard. Those who prepare food should keep in mind that food borne illness is always possible. Foods that are high in moisture nutrients and those that are chopped and ground are especially favourable hosts (Sizer and Whitney, 2019).

At this point, hygiene and cleanliness is important by the food handlers to avoid contamination and cross contamination of the foods. There are some basics for handling food and in every step of food preparation. It is necessary to follow the four steps of the food safe campaign to keep food Safe and they are:

Clean – Wash hands and surfaces often;

Separate – Do not cross-contaminant;

Cook – cook to the right temperature; and

Chill – Refrigerate promptly.

Clean- Wash hands and surfaces often and should be washed with soap and clean water before and after handling food items when cooking, eating and after using the toilet. Wash and clean utensils, and tools to be used such as plates, knives, spoons, chopping boards, bowls, and other. All the tools and equipment should be kept neat and away from contaminants like flies and kitchen pests. Effective hand washing has been an essential control measure for prevention of pathogens (Nigusse and Kumie, 2012). This measure should be taught to both male and female Students especially the foods and nutrition Students to avoid food borne diseases such as the deadly EBOLA and LASA FEVER and the most recent CORONA Virus Disease, tagged COVID 19' . Although an air borne disease, COVID 19', can also be transmitted by unlearned hands and surfaces like tables, work tops and others.

Separate – Do not cross-contaminant. Avoid cross contamination of food items before use, so the food items already saved from contamination such as vegetables, cooked foods will not be contaminated with raw foods such as meat, poultry, fresh fish and others. They can be separated neatly by wrapping meat, fish and poultry in cellophane and put in plastic bowls with cover in the freezer to avoid the water from them dripping into other foods. These raw foods (meat, poultry, fresh fish and others) are capable of contaminating other foods. Do not use the same board for cutting poultry, meat or fish for cutting vegetables.

Cook – cook to the right temperature.

Cooking is the thermal heating of foods at sufficient temperature over time to kill micro-organisms in the food. Cook all food to the minimum internal temperature as measures with thermometer before removing from the heat source. For reasons of personal preference, consumers may choose to cook food to higher temperature. (See chart on appendix 18).

Chill – Refrigerate promptly. Fresh foods should be cleaned and chilled in the refrigerator such as vegetables fruits and dairy foods, while frozen foods should be frozen at the right temperature (5°C or below).

It is necessary in handling practices to think about food indicators, and food security in-order to have foods that are almost in perfect conditions, get foods in season, prepare and serve food that are appetizing, attractive with good aroma and nutritious enough to enhance body development and prevent malnutrition and other food related diseases. Foods should be free from deterioration, contamination by pathogens and chemicals so that they can be in good condition to the consumers. There should be sufficient quantities of appropriate food in the market so that consumers can make better choices for meal preparation. In purchasing, the food handlers should think about foods in season as they are fresh, at their best, most plentiful

and cheaper so that there is enough choice to make, buy and preserve, using all methods of food preservation and storage for later use.

Importance of Hygiene: Hygiene is a very crucial point in food handling practices

- It helps to keep out micro-organisms from our foods
- It helps to protect us from illnesses and diseases
- It promotes nutrient intakes and utilization
- It saves cost and time
- It leads to healthy living and longevity

Food hygiene is the conditions and measures necessary to ensure the safety of food from production to consumption. Food can become contaminated at any point during slaughtering or harvesting, processing, storage, distribution, transportation and preparation. Lack of adequate food hygiene can lead to foodborne diseases and death of the consumer. (WHO, 2019). It aims to study methods for the production, preparation, and presentation of food, which is safe, and shelf-stable. It covers the proper handling of every variety of foodstuff and drink, and the equipment and apparatus used in their preparation, service, and consumption (Uko- Aviomoh and Nwabah 2009) .

A food handler is defined as a person in food trade or someone professionally associated with it, such as an inspector, who in his routine work comes into direct contact with foods in the course of production, processing, packaging or distribution (Zain and Naing 2002). Food handlers play a major role in ensuring food safety throughout the chain of producing, processing, storage, and preparation of foods. Mishandling and disregard for good hygiene measures on their part may result in food contamination and its attendant consequences (Williams, 2001) .Food poisoning and other food related diseases like typhoid

and cholera could result if food is not properly handled and prepared. Proper food handling and preparation is an important aspect of nutrition and community health that require attention.

According to e-How in Ifeadike, Ironkwe, Adogu, and Nnebue (2018), a food handler is a person with any job that requires him/her to handle unpackaged foods or beverages and be involved in preparing, manufacturing, serving, inspecting, or even packaging of food and beverage items. All food handlers are required to use proper hygiene and sanitation methods when working with foods. Food hygiene is the set of basic principles employed in the systematic control of the environmental conditions during production, packaging, delivery/transportation, storage, processing, preparation, selling and serving of foods in such a manner as to ensure that food is safe to consume and is of good keeping quality (Plaut, 2000). Food handling is one of the important factors in determining the safety of food. However, food itself can pose a health threat due to difficulties in securing optimal hygienic food handling practices. (Okubagzhi 2008 and Beaver, Jung & Cupp 2004) Some of the practices as highlighted by them, are discussed below.

Purchasing and Receiving: All foods served in a food service establishment must come from an approved source. Foods service establishments should work with their suppliers to ensure the foods they are using meet the food safety standards. Temperature and time are the two most important factors to control. Food need to be received and stored as soon as possible. The staff of the food service establishment should be checking for temperatures and conditions of incoming food. All refrigerated foods should be put away quickly to prevent time and temperature abuse. Frozen foods should not have large ice crystals, be discolored or dried-out. Canned goods should have labels, no swelling and flawed seams, rust or dents. Never accept home-canned foods because of the risk of botulism.

Dry Storage of Goods: All canned foods and dry ingredients are stored in a designated area. Foods should not be stored in areas such as restrooms, furnace rooms, stairwells or hallways. Foods should be stored off the floor and in closed containers. Storage areas should be well ventilated and pest free. Dry storage areas can become a food source for rodent and insects. Keeping containers closed, in sound condition and off the floor help to keep the storage area pest free. Stock rotation is a good management practice. Foods and chemicals need to be stored separately. Chemicals should be stored below and away from foods to prevent chemical contamination.

Cold Holding of Foods: Cold holding is storing foods under refrigeration at 5°C or below. Refrigeration prevents food from becoming a hazard by slowing the growth of most microbes. Some organisms like *Listeria monocytogenes* is significantly slowed but not stopped by refrigeration.

Walk-in Refrigerator Temperature: The walk-in refrigerator is the major cold storage area in a food service establishment. The temperature of a walk-in refrigerator must be sufficient to adequately hold the food temperature at 5°C or below. The temperature of a walk-in refrigerator is usually colder than 5°C. To compensate the opening and closing of doors and demands of adding additional foods for storage and cooling. Foods need to be stored to prevent contamination. All cooked foods and foods that will receive no further cooking should be stored above other foods. Foods need to be stored to allow enough space for air to circulate around them.

Thawing foods: Thawing food may take several hours or days depending on the size of the food item being thawed. Thawing must be done so that the risk of cross-contamination is reduced, and the time that potentially hazardous food is in the temperature danger zone (5°C to 57°C) is kept to minimum.

To thaw foods safely, the following steps should be taken:

- Thaw under refrigeration (5°C and below)
- Under cold running potable water (safe to drink) of 21°C or less as part of the cooking process.
- In a microwave then transferred to conventional cooking equipment with no interruption in the process.

Cooking Temperature: Cooking is the thermal heating of foods at sufficient temperature over time to kill microorganisms in the foods.

The following are the requirements for the different foods:

- Beef, fish, seafoods, eggs – 62.7°C.
- Rare Roast Beef - 54°C.
- Pork – 62.7°C
- Poultry, foods containing poultry, stuffed meats or stuffing containing meat, casseroles, containing potentially hazardous foods – 73.8°C.
- Restructured meat, ground or fabricated meat - 68°C.

Cooking requirements are based on the biology of pathogens. Different species of microorganisms have different susceptibilities to heat.

Foods characteristics also contribute to the lethality of cooking temperatures. Heat penetrates different foods at different rates. High fat content reduces the lethality of heat. High humidity in the cooking container or the moisture content of the foods aid the lethality of heat. To effectively eliminate pathogens, there are a number of factors to consider: the level of pathogens in the raw product and the initial temperature of the foods and the bulk of the

foods. Another factor to consider, to kill the pathogenic organisms in foods, cooking must heat all parts of the foods to the required temperatures.

Reheating Foods: Reheating is the thermal process to heat food that have been previously cooked and cooled in a food service establishment. Reheating of food is termed “rechauffe” in nutrition which means re-heated food and it is applied to left-over food from the previous meal (Nwabah, 2011). Every housewife at one time or the other is faced with left-over food and experience, the economical housewife will turn and improve the left-over food in to adequate, palatable dishes to be served with other meals. Care must be taken when re-heating left-over food. Proper reheating can eliminate a major portion of pathogens. Proper reheating is heating a food to 73.8°C within two hours. The more a food is processed, the greater the risks. When food is held, cooled and reheated, there is an increased risk from contamination caused by personnel, equipment, procedures and other factors. When food is cooked and cooled the product goes through the danger zone (optimal temperature range for microorganisms to grow) several times which also increase the risks.

Hot-Holding of Foods: Once a food is heated or cooked, the food must be maintained at a temperature to limit the growth of bacteria. The correct hot holding temperature is 57°C. The potential for growth of pathogenic bacteria increases once a food is reheated than the potential in raw food. The spoilage organisms that may be present in raw foods inhibit the growth of pathogenic organisms by competition. Once a food is cooked, these spoilage organisms are reduced.

Cooling Foods: Cooling is a process of removing heat from food quickly enough to prevent microbial growth. One method is done by placing food in shallow containers no deeper than 2 inches and leaving them uncovered until cold, 5°C or below. When potentially hazardous food is cooled for an extended period, the food is subject to the growth of a variety of

pathogenic micro-organisms. Bacteria grow ideally between 21 - 48°C. (The human body temperature falls in this range). The longer the time the food is allowed to be held in this range, the greater the risk of microbial growth. Excessive time for cooling potentially hazardous food has consistently been identified as one of the leading contributing factors to foodborne illness.

Cross-Contamination: Bacteria (pathogens) can be transferred to food from utensils, surfaces (cutting boards), food workers hands, raw meats, poultry, fish and seafood. Contamination is the presence of disease-causing microorganisms or harmful substances in food. Food can become contaminated at any time and can be contaminated by other foods. To help prevent cross-contamination, raw meats, fish, and poultry must be kept away from cooked and ready-to-eat foods. (i.e. separate cutting boards, separation of duties, preparing vegetables before preparing meats). Employees need to minimize bare hand contact with cooked and ready-to-eat food. Equipment, utensils and food contact surfaces must be washed, rinsed and sanitized.

Room Temperature Storage: Temperature is one of the prime factors that control the growth of bacteria in food. Many types of pathogens and spoilage bacteria are prevented from multiplying to significant levels that cause foodborne illness with proper holding practices. All food need to be stored cold 5°C and below or hot 57°C or above. Preparation procedures should have built in barriers to limit the time potentially hazardous foods are in the temperature danger zone. (5°F to 57°C.) (Hartmann and Dohle 2013)

Control measure to ensure foods are out of temperature for limited times include:

- Refrigerate foods before preparation.
- Prepare foods not further in advance than necessary.

- Prepare small batches of foods and return them to the refrigerator before cooking and serving.

Final Cook Temperature: Cooking requirements are based on the biology of pathogens. The amount of heat required to destroy the organisms will vary. Different species of microorganisms are susceptible to varied levels of heat. To kill all pathogens in food, cooking must bring all parts of the food to required temperature for a correct length of time. The temperatures listed in our code are high enough to take in consideration the time requirement. (Hartmann and Dohle 2013)

Serving Procedure: Develop good serving procedures to protect foods and customers.

- Employees should wash their hands after dusting and cleaning tables and after touching any item that can contaminate their hands
- Avoid touching ready-to-eat foods with bare hands. Use a utensil such as a tong, deli tissue or glove.
- Do not re-serve unwrapped bread, rolls, crackers, salad dressings, or relish trays.
- Avoid touching the food-contact surfaces of glasses, cups, plates or tableware.

Personal Hygiene: Personal Hygiene is keeping oneself clean and being a very neat and attractive atmosphere: It involves being clean from head to toe including clothing that one puts on. Personal hygiene is very important in food selling, preparation, handling and storage. Good personal hygiene of each food worker is important to good food handling practice. It is equally important to observe these simple rules for personal hygiene:

- 11) Keep your fingernails cut short and clean
- 12) Wash your hands always
- 13) Cover your mouth and nose when sneezing or coughing

- 14) Keep wounds sores and boils covered
- 15) Wash your hands before touching or eating
- 16) Do not touch food with hands more than necessary
- 17) Do not use your tongue to taste food from a cooking spoon
- 18) Keep all pots, pans, dishes, cutlery and glasses clean
- 19) Avoid talking in the food environment while cooking
- 20) Avoid scratching your hair and body while handling food but if you do, wash your hand with soap and water before handling food.

Improper hand-washing is known to be the number one cause of foodborne illness in Washington State. Food service workers should wash their hands by applying soap and using warm water, scrubbing thoroughly, rinsing, and then drying using paper towels or a drying device. (Hartmann and Dohle 2013)

Food service workers must wash hands:

- before starting to work
- during work as necessary to prevent contamination of food
- after handling unclean items
- after handling raw meat, poultry, or aquatic foods
- after using the restroom (must wash twice, once in restroom and again in kitchen)
- after eating or smoking

Food service workers are required to use utensils to handle ready-to-eat food. (i.e. tongs, spoons, tissues, foil, gloves). No bare hand contact of ready-to-eat food. (Hartmann and Dohle 2013). Food service workers must maintain a high degree of personal cleanliness and restrain hair as necessary.

Accordingly, food handlers with poor personal hygiene and lack of awareness of important issues in preventing food borne diseases, working in food establishments could be potential sources of infections of many intestinal helminthes of protozoa and enterogenic pathogens (Nigusse and Kumie, 2012). All food handlers are required to use proper hygiene and sanitation methods when working with food. Food hygiene is the set of basic principles employed in the systematic control of the environmental conditions during production, packaging, delivery/transportation, storage, processing, preparation, selling and serving of food in such a manner as to ensure that food is safe to consume and is of good keeping quality. (Schlundt , Toyofuku , Jansen , and Herbst 2004).However, food itself can pose a health threat, a problem that is serious in developing countries due to difficulties in securing optimal hygienic food handling practices. The public health objective of food hygiene and safety is the prevention of illness attributable to consumption of food. This is because of adequate supply of safe, wholesome and healthy foods are essential for the health and wellbeing of humans.

According to Ifeadike, Ironkwe, Adogu, and Nnebue (2018) poor and faulty food handling practices have been identified as the leading cause of the majority of foodborne diseases. They identified some poor hygiene practices exhibited at work to include: lack of provision of medication by establishment, non isolation from work environment when sick, irregular use of sanitizers and disinfectants, lack of change of hand gloves between ready to eat meal, irregular food hygiene training, non use of thermometer to check food temperature. This finding of the study is a strong indication of the poor health status and poor hygiene practices of food handlers/establishments in the FCT and agrees with the findings of Okojie, Wagbatsoma, and Ighoroge (2005) in Benin, who in an assessment of food hygiene among food handlers in a Nigerian university campus reported that the knowledge and

practice of food hygiene and safety were poor.(Okojie et al 2005). It, however, differs from the findings of Isara and Isah (2009) who reported good knowledge and practice of food hygiene and safety among food handlers in fast food restaurants in Benin City, Edo State.

It is a known fact that chlorinated tap water kills *Salmonellae*,(Bryan 1988) yet many food handlers living in the city slums and shanty towns do not have access to potable pipe borne water and so are at a high risk of infection, especially with enteric fever known to be endemic in places of low personal hygiene and environmental sanitation.(Patrick, Findon and Miller 1997) This study has also established that food handlers in the Federal Capital Territory (FCT) constitute significant risk in the spread of enteric fever. It has also buttressed the role that food handlers play in disease transmission as several authors have reported. (Yang, Left, Mctague, Horvath, Jackson Thompson and Murayi 2013) However, given the time and money required to improve environmental sanitation, and increase the accessibility to potable water, the most rewarding option are regular food hygiene education and periodic screening of food handlers with a view to following up those found infected and getting them cured. According to Okojie et al, in their study, only about a third of respondents had pre-employment medical examination .Majority of the respondents in their study (89.3%) reported that they usually washed their hands before starting the preparation of food and after handling raw meat. A smaller number reported that they do not use hand wash detergent to wash their hands before starting the preparation food and after handling raw meat. In studies conducted by (Altekruse, Street, Fein, and Levy 2016) and (Yang, Left, Mctague, Horvath, Jackson Thompson and, Murayi 2013) 87% to 92% of the respondents also indicated that they usually washed their hands before handling foods, and 62% to 100% that they also usually washed their hands after handling raw meat or poultry.

Effective hand washing therefore has been an essential control measure for prevention of pathogen. Less than one third of these respondents indicated using soap and water for washing their hands before starting the preparation of food and or after handling raw poultry or meat. Furthermore, it is most probable that majority of the participants do not wash hands according to good hygienic practices. This may be connected with lack of potable water and standard hand wash facilities in establishments. Even when such facilities are available, most participants do not have basic understanding of standard hand washing procedures. Other notable violations include; non-provision of thermometers for temperature control. It is important to note that further evaluation of the above mentioned factors is vital in foods safety and how best to control these factors is of importance in improving the system.

The study by Nigusse and Kumie (2012) to assess foods hygiene practices and prevalence of intestinal parasites among two hundred and seventy seven (277) foods handlers working in Mekelle university students cafeteria, Addis Ababa showed that there was practice of foods hygiene. They noted that the parasite prevalence rate was 49.3% with *Entamoeba, histolytica* being the most common parasite. They concluded that the practice of foods hygiene among the study group was poor and they recommended improvement handlers' personal hygiene, frequent medical checkups and provision of conveniences for the handlers and consumers in foods

It was observed that respondents who used soap and water for cleaning, vended foods at locations that were relatively closer to water source, compared to other vendors who used other methods to clean their utensils. Unkept fingernails, skin lesions and poor foods protection from flies were some of the foods contaminating risk factors observed in the study. They concluded that there was the need for foods vendors and other foods handlers to be trained on basic principles of safe foods handling and they should be closely supervised.

(Musa and Akande, 2003). The study by Isaac, Dominic and Wellington (2013) findings on foods hygiene practices: attributable to the influence of school authorities and the level of in-training of foods vendors, the study points out that foods vendors in educational institutions generally adhered to good foods hygiene practices, namely, regular medical examination (93%), protection of foods from flies and dust (55%); proper serving of foods (100%); good hand hygiene (63%); and the use of personal protective clothing (52%). They asserted also that regulatory bodies legally mandated to efficiently monitor the activities of foods vendors lacked the adequate capacity to do so and then concluded by saying that efforts should be geared towards developing training programmes for foods vendors as well as capacity building of the stakeholders.

The study by Mizanur, Muhammad Taha and Kamaluddin (2012) found that out of the 361 street foods vendors recruited, only 10.8% of them practices good foods hygiene, 71.5% had fair practice whereas 16.9% had poor practice. They found out also that training increased the foods safety attitude and practice. They finally recommended that continuous monitoring and periodic training incorporating basic principles of foods safety and microbial surveillance of foods is essential to optimizing foods hygiene in the foods vending business. In the study by Mulugeta and Bayeh (2012) of good foods hygiene, the following observations were made, after investigating the 455 subjects: 66% of the establishments had flush toilets whereas 5.9% of the establishment had no toilet. Only 149 (33.6%) of the establishments had a proper solid waste collection receptacle. The study also noted that there was statistically significant difference between trained (professional) handlers and non-trained handlers with regard to foods hygiene practices. While more than 50% of the handlers prepare meals ahead of the peak selling time, more than 50% of the left over was poorly managed. They concluded that foods hygiene practices among the studied group was poor

likewise the sanitary conditions under which they practice and recommended that educational programs aimed at improving the attitude of handlers be made available coupled with licensing of foods establishments and regular inspection of activities of such establishments.

The study by Elizabeth, Agnes, Sophia, Priscilla, Hamida, and Janet (2010) on “assessing foods hygiene standard practices among small scale foods handlers in central Accra, Ghana” observed that 40% of the foods handlers were located in unkempt places, while 60% were located in an acceptable area. 28% of the foods handlers did not comply with cleanliness of their cooking utensils. With regards proper storage of raw and cooked foods, only 70% of the foods handlers had compliance, and 64% used equipments to serve. Cleanliness of cutleries for service recorded 65% of non-compliance. 58% had neat appearance and used cleaned napkins for service whilst 42% of them did not. 31% of the food service establishments did not put correct measures in place for the control of flies in their service area, and 5% cleaned their hands before serving foods. They concluded that there is the need for more effective information and creative ways to disseminate foods hygiene principles to these small scale foods service providers. In most of the literatures reviewed above, it could be noted that most of the foods handlers had good knowledge of foods hygiene but this did not translate into good practice of foods hygiene. From literature too, majority of these handlers had unacceptable practices especially with regards hand washing at the right time and with the right materials, wearing of protective apparels, proper cleaning of cutleries and utensils, knowledge of when not to handle foods and good behavior while handling foods, location of eating establishment in the right place, meeting the correct standard of a restaurant and provision of adequate and well maintained facilities for convenience. Regular monitoring of the activities of the foods establishment by designated authorities will ensure that high standards are maintained at all time.

Food hygiene is such an important issue because the import of improper food handling both at home or away from home can be devastating where facilities are not readily available to tackle the challenge. Food poisoning or food borne illnesses, which often results from improper food handling, is too serious to under-mind. So adequate food hygiene Practices for food Handlers and others alike should be encouraged.

Facilities in Foods and Nutrition Practicals in Secondary schools

Foods and Nutrition Laboratories facilities include:

combi/steam/conventional ovens (Rationale)

full-size blastchiller

walk-in fridge

walk-in freezer

grill

fryer

high capacity steam-jacketed kettles

proofers

autoclave

high-capacity mixer (floor model)

packaging machine

ice cream machine

meat slicer

vegetable cutters

Integrated stainless countertops, with one wheelchair-accessible

Post per workstation

Induction plates

Gas stoves with ovens

Table-top mixers

Industrial table-top food processors

storage units and roll-in refrigerators

Others include, work table, sinks, dish washer, blenders, pots, sauce pans and frying pans, cooking spoons and knives and utensils among others. Foods and Nutrition Laboratories provide the best possible location for hands-on training programs, and product development and testing.

Gender and Foods and Nutrition Practicals in Secondary schools

Gender is the condition of being construct which distinguishes the role behavior, mental and emotional characteristics between male and female (Keller, 2011). It is expressed in many spares of human endeavour its level of demonstration varies with time, place and culture. It relates to the circumstances of discrimination against a person, politics, religion, economics and social services and determines the level of Political and Economic empowerment that keep certain group of people at advantaged position. In relation to offering Foods and Nutrition in secondary school male gender has been a problem and the females mostly undertake the subject.

Since gender is defined as “Sex” and bias is defined as “Preference or inclination that inhabits impartiality; prejudice” (Azubuike 2012). Thus, gender bias is separation of gender in a way which prefers sex over the other. Gender bias in Home economics refers to preference for or favoring of one sex, and the other in study of Home economics. As can be seen, gender bias in Foods and Nutrition is a multifaceted and complex issue. Nevertheless, the problem of gender in quality in Foods and Nutrition is not only a national concern but that

of the whole world at large. Thus the misconception of Foods and Nutrition as a woman's subject. A gender gap exists between males and females in the study of Foods and Nutrition.

An evidence of this gender gap is that the gender starts at home. The home provides the child with first experience, these include the models with which the child can identify, the parents provides a range of materials for home play, there are also value system which are basic to special roles. The children quickly learn that the roles of men in the family are different from the role of women. This differential role of boys and girls constitute a serious problem to Home economics studies as it affects the male students from undertaking Foods and Nutrition as a subject.

Often times, subtle message are sent to girls and boys about expectations for their behaviours, attitude, perception and other aspects in their lives. It is important to note that this is not always the case nor is necessarily intentional. Many parents, educationists and the society out there are indeed very sensitive to the issue of gender. They are making great strides to create equity in all areas for males and females. On the other hand, there are those parents, educators who are shocked and surprised to realize that they unintentionally separate signals about expectations for girls and boys. Differential treatment by educators and parents divert boys from the study of Foods and Nutrition.

It is apparent that there is a gender gap in Foods and Nutrition, there are variety of theories as to why males lose interest in Foods and Nutrition. One speculation is that boys simply approach Foods and Nutrition differently. Some point to parental influence, some blame teachers and the overall educational institution. Still other ideals lay the origins of this gap at role models or lack of role models. Another cause of the gender gap in Foods and Nutrition is believed to be the society. Although the most common point to a combination of all the factors, each of the major influences will be discussed individually.

Teachers and educational system are believed to influence the gender gap in the study of Foods and Nutrition Teachers may treat girls differently than boys causing differing expectations for instance boys and girls are often approached different when dealing with inappropriate physical and verbal attacks on each others, as such boys may want to say that are more task oriented than girls (Miller and Abrahams, 2009).

The lack of strong male role model is believed by some experts to be yet another reason for the gender gap in the study of Foods and Nutrition between males and females suggested that providing children the opportunity to see guest speakers from both genders in nontraditional communication careers. Sense tells us that we find possibility or lack of possibility in what we experience. Females who see and develop communication with other females who have careers in science and technology field will be more likely to have these high expectations for themselves. These males will perceive Foods and Nutrition plausible career for themselves. It best that parents are the most important influential people in a child's life. Parental views on gender roles, belief system regarding genders, and actions towards both sexes will inevitably influence children. Children are sent strong signals about the world around them more specifically about men and women, from parents. Parent's actions and words send messages about the parents' beliefs. Parent should closely examine what they say with their action or words.

Okorie and Ezeji (2008) state that some parents

are not guiding their male children well to develop interest in the study of Foods and Nutrition subject. They would want their children to develop interest in Law and Medicine rather than Foods and Nutrition. Ossai (2006) emphasized that the influence of parents on the male's interest in the study of Foods and Nutrition is unquestionably one of the strongest and

most persistent factor determining what the child interest in school would be. Parents are often more interested in occupations or profession which will bring money and prestige to the family, then in suitability of their children for a particular career (Okoh, 2006). It is therefore imperative that parents always set aspirations of their children hence they would not want their male children to study what they regard as woman's subject. Consequently the name given to the course tend to discourage females and males mostly males in studying the course. Thus, women are known to be mostly involved in home domestic works or activities. The makes interest in the study of Foods and Nutrition started from home (Ferry, 2008) stated that the "root causes of gender gap in Foods and Nutrition is from home". The home provides the materials for playing role difference which create gender differentials among the children of the home. To curb this problem, we stated that parents should not give room for anything that should create gender difference among the children since this tends to make the children loose interest in some areas of life particularly males that would not want to fall the line of Foods and Nutrition as subject/course. Asia Pacific University (APU) (2008) emphasized that parent should guide and educated male children on the importance of Foods and Nutrition in societal building since it is going to help the males to offer Foods and Nutrition as a subject. In the same vein another issue why males are not interested in the study of Foods and Nutrition is poor orientation. If males still in secondary schools are given good orientation about the study of Foods and Nutrition as a course in tertiary institutions of learning, the males will study it particularly when the males must have been taught about it merits and demerit and career areas that are available to a Foods and Nutrition it will arouse the males interest for them to know that Foods and Nutrition is not just all about cooking or domestic works. Dike (2006) suggested that if career days are organized by schools from time to time, it will help motivate and stimulate the interest of students as the students listen to some experts in the various areas Foods and Nutrition this is because some male students

would want to study Foods and Nutrition but because such students were to shy away from the course whereas it is a course which the students would have done better in, than the other subjects. Conclusively, male students should be encouraged to offer Foods and Nutrition as those who are interested, have recently seen taken over confectionary business from the females.

Instructional Methods for Teaching Foods and Nutrition Practical

The subject Foods and Nutrition involves the use of a number of teaching methodologies depending on the topics being covered, level of understanding of the learner, available resources, teacher competences, as well as availability of time. These methodologies are designed to enhance the learners knowledge and skills acquisition. Its *hands-on* approach enables learners to develop manipulative skills and they end up having refined motor skills. According to Sprinthall and Sprinthall (1991), it is like a baby to a lump of clay that can be moulded and fashioned into any shape by the hands of the master craftsman, who is the teacher. So if the master craftsman fails to mould the baby well, then malformations are likely to occur and if not rectified in time, these will dwell with the child for a life time.

As put by Mahundi (2015) a teaching method is primarily concerned with the most appropriate presentation of lesson material in any given circumstance. No single method will serve equally well in all situations. In as much as teachers are inclined to favour particular styles and techniques dictated largely by subjects taught as well as their personality make-up, it needs to be pointed out that no teacher can solely rely on a single method. In this case, Mahundi, (2015) is implying that in the course of presenting his lessons, the teacher is invariably required to use a variety of methods. While it is true that each subject has its own special method, leading educationists such as. Rousseau (1712-78), Pestalozzi (1746-1827),

John Dewey (1859-1952), Maria Montessori (1870-1952) and Herbert Spencer (1820-1903), among many others, have stressed the importance of general method. For Pestalozzi for instance, drew attention to the need for personal experience in learning. Spencer on the other hand, provides a number of teaching maxims, such as to proceed to teach from the known to the unknown, simple to complex, concrete to abstract and from the specific to the general. It has to be noted that the development of a general educational method has not taken place in isolation, but rather is a result of the developments in other spheres of education. It has been influenced by changes in theories of psychology of learning as well as the philosophical conceptions of the nature of man.

Quite a number of teaching methods have been in use for centuries. Others have evolved along the way, while others are mere modifications of some classical methodologies. Kochhar (1997) stresses that the choice of a teaching method/s depends largely on the information or skill that is being taught. It may also be influenced by the aptitude or enthusiasm of the students. For Foods and Nutrition practical the following methods are used in enhancing teaching in secondary schools and others institute alike

Demonstration: As far as practical subjects are concerned, demonstration is the best known teaching method. It is used to guide the development of the pupils' psycho-motor skills to be efficient. Farrant (1990) defines demonstration as a practical form of learning by imitating. On the other hand, Gatawa (1990) defines it as a direct means of explaining things to pupils. During demonstration, people are informed about how to carry out a particular task, with possible inherent dangers being explained or shown. It has strength in that it calls for an increased degree of attention, concentration and interest which can be further exploited by other techniques, i.e. pupils will be creative in their way of thinking. The increased activity level of pupils leads to the acquisition of new knowledge and skills which will be useful in

future. Another strength of demonstration is its ability to provide a concrete and realistic visual picture of what is being presented to supplement word images. This usually results in a more lasting impression, according to Kochhar (1997). The senses of sight, smell, touching, hearing or taste are enhanced and the experience builds tangible images in the minds of the learners which may be very permanent. The demonstration can be spot or step-by-step, depending with the skill being taught. This is a key method in the teaching of Foods and Nutrition because of its pragmatic approach, because after demonstration, the pupil must be able to follow suit, (Kochhar, 1997). Some of its weaknesses are: lacks student focused learning. A drawback of traditional training is that it inherently places the most value on standards, curriculum and passing tests as opposed to student-focused learning, lacks process oriented learning, lacks of interactivity and so on.

According to Mahundi (2015), demonstration was singled out as the most commonly used method of teaching Foods and Nutrition practicals. In justifying the choice of method, demonstration was said to be very efficient, since during practicals it helped pupils to grasp skills well since they would observe and experience the process/skill. Demonstration helps pupils to understand and master different techniques and skills from the teacher, and in return they will also be able to practice these skills as pupils see reality in what they are doing. This therefore ensures good results in practicals and quick grasping of ideas. This method also helps pupils to identify and remember ingredients and equipment used. Above everything else, demonstration is effective as it uses a multi-sensory approach e.g sight, feeling, hearing and smelling.

Explaining/Lecture: Explaining or lecturing is the process of teaching by giving spoken explanations of the subject that is to be learned. Explaining or lecturing is often

accompanied by visual aids to help students visualize an object or problem. Lectures on the other hand are often geared more towards factual presentation than connective learning. It is a very appropriate method for enhancing learners' acquisition of knowledge. Montessori (1969) highlights the need to have a child taught how to do a task before execution of the task. The lecture thus becomes the foundation method upon which other strategies are going to be built to complete the process of learning. Other methods like the demonstration or experiment method can only be effective on condition the lecture method has been made proper use of. At the end of the day, it becomes clear that no one single method can work on its own. According to Mahundi (2015), the explaining/lecture method was said to enhance learners' acquisition of knowledge. It is through this method that pupils get to understand what they are going to prepare during practicals well in advance. On the other hand, group work was justified as being helpful to pupils in promoting cooperation and sharing of ideas among pupils in class. Every individual is likely going to participate and this is also an ideal method during practical lessons. Class discussion was also selected by some teachers because of the easy interaction it offers among pupils. There is sharing of ideas amongst pupils and also between teacher and pupils. But the method becomes problematic if there are no materials available to work with. Students tend to forget what was taught by the teacher and how to carry out the practical if left alone.

The Discussion Method: This method comes in handy and is most effective when stimulating and facilitating the learning process. The discussions can be carried out in groups or even at classroom level, where learners interact sharing new and old ideas and enriching their knowledge. According to Wikipedia, free encyclopedia, discussions are superior in contributing to the application of the materials learnt and building attributes that are important in shaping behavior patterns. Pupils easily understand when they discuss what they

have learnt as they will be clarifying understood concepts. As such, pupils will not easily forget what they have discussed. Team spirit or a spirit of oneness is built through discussions. Farrant (1990) posits that discussions enable children to get on well as they are involved in group activities and discussions. Children may have a positive attitude and behavior towards others. According to Mahundi (2015), class discussion was selected by teachers because of the easy interaction it offers among pupils. There is sharing of ideas amongst pupils and also between teacher and pupils he maintained.

Experimentation: This is an approach that involves laboratory work where learners solve their problems with practical apparatus. Pupils make trials in order to study what happens and gain knowledge and skills through examining, investigating and observing to come up with conclusions. Dewey, who advocated for the pragmatic philosophy to teaching, highly encouraged the use of experimental methods in the teaching. In other words, pragmatism according to Dewey is an overriding philosophy in practical subjects because it is a philosophy of action and deeds, which encourages practical activities by pupils to be well executed. For instance, in Foods Science, the experiment method can be used when testing for the presence of starch using iodine solution. Both the test and control groups will be observed. The blue-black colour signifies the presence of starch. Pupils will be involved in putting the reagents together and making necessary observations and making recordings. The experiment method, together with the demonstration method is key in the teaching of Foods and Nutrition and they promote content mastery and skills manipulation by pupils. Although, less frequently used through experiments, learners discover for themselves as they can easily see results and capture concepts quite clearly. (Mahundi, 2015).

Project Method/ Problem solving method: This is another teaching methodology which employs a participatory approach. This is whereby pupils are given tasks to execute and

discover on their own as they actively participate as individuals through use of their own hands. The project method originated in the USA with the rise of progressive school movement. A project was described as a large problem of practical concrete, manipulative type, which challenges the interest of the student and draws out his powers of planning in the actual solution of his problem. Its essence and advantage is that pupils will remember vividly activities done through this method and promotion of cooperative group work. Pupils share ideas, experiences and knowledge and they develop a sense of responsibility and display initiative and self criticism. Mahundi concurs with Williams (2001) that the teacher's responsibility is to ensure that pupils learn from one another, with each pupil contributing his share on the basis of his ability and interest. The more mature pupils undertake the abstract and difficult features of the task, while leaving the simpler and routine elements to others. Also concepts learnt can also be used to solve immediate problems and even those encountered in the future. Sprinthall and Sprinthall (1981) states that if children are engaged in problem solving activities, they learn better. Problem solving enables children to apply the knowledge and skills gained if they face the same problems at home. Problem solving method involves identification of the problem and devising a plan. However, it has to be noted that projects require a lot of time, they cut across ordinary class teaching and normal timetable arrangements. They do not have to be overstretching as this will result in lack of coordination and pupil enthusiasm and interest will be lost.

Collaborating: Collaboration allows students to actively participate in the learning process by talking with each other and listening to other points of view. Collaboration establishes a personal connection between students and the topic of study and it helps students think in a less personally biased way. Group projects and discussions are examples of this teaching method. Teachers may employ collaboration to assess student's abilities to work as a team,

leadership skills or presentation abilities. Collaborative discussions have many forms, e.g. fishbow discussions. After some preparation and with clearly defined roles, a discussion may constitute most of a lesson, with the teacher only giving short feedback at the end or in the following lesson.

Learning by Teaching/ peer teaching: In this teaching method, students assume the role of teacher and teach their peers. Peer teaching is also known as the monitorial system, (Farrant, 1990). Students who teach others as a group or as individuals must study and understand a topic well enough to teach it to their peers. By having students participate in the teaching process, they gain self confidence and strengthen their speaking and communication skills. In this system, pupils communicate with other pupils those lessons they have been taught by the master teacher and this is a way of multiplying the person and skill of the teacher and encouraging bright pupils to exercise their gifts. Since the very act of teaching requires that one understands what s/he is going to teach, this becomes very beneficial to the pupils who are thus helped to develop maturity as a result of the responsibility placed upon them.

Debates: This is a scenario where the teacher gives a topic for discussion with students grouped into two groups opposing each other for the purposes of constructive criticism. This is when intelligent minds come together. According to an internet reference, it is a discussion, as of a public question in an assembly involving opposing viewpoints, (dictionary.reference.com/browse/debate). In Foods and Nutrition, Traditional methods of cooking are more nutritious than those of today, can be a topic for debate. Teacher's role is that of facilitating the debate making sure it remains focused.

Guided Individual Discovery/ Self discovery learning: Discovery is an instructional method which allows the students the independence to use their mental processes to contribute to knowledge, understand higherto difficult concepts, generalizations and

principles or provide answers to problems suited with minimal guidance from the teacher on the attainment of instructional objective. Discovery method is students centered and agrees with the early psychologist like Bruner, (1990) who said that learning involves activities processing of information, this is organized and constructed in a unique way by each individual. The processing will lead into exploration and discovery. Discovery method can be guided and unguided and the unguided can be inductive or deductive. Both guided and unguided discovery involves finding out and requires students to engage in some complex mental processes including:

Formulating problems for investigation,

Formulating hypothesis to guide investigation,

Design experiment to collect data, making generalization from knowledge required from data, to find solution to problem,

Developing certain scientific attitude like objectivity, curiosity, open mindedness and honesty.

According to Farrant (1980), discovery learning is sometimes known as heuristic method. Mahundi (2015) also reiterates that apart from being called the heuristic method, the discovery method, as termed by Hebert Spenser, is the art of making children discover things for themselves. Its claims are such that, *“knowledge gained by self effort and discovery is better assimilated and remembered than that which is merely memorized,”* (Farrant, 1980:46). Spenser states that children should be told as little as possible and induced to discover as much as possible. However, it has to be noted that, it is not easy to strike a sound balance between providing too much and too little guidance and the system can only work where there are good supplies of well indexed resource material.

Field Trip: According to Mahundi, (2015), field trips offer the opportunity for pupils to observe production stages taking place, example, in the processing of milk and other dairy products. The opportunity granted by the field trip is a real life experience and the information comes from an expert in the area who is actually demonstrating on the job hands-on experience. However, such trips are often dismissed as very costly for most schools, no wonder why they are a rare phenomenon.

Practical Demonstration Instructional Method: Teaching and learning using Practical Demonstration method means tasks in which students/learners observe or manipulate real objects or materials or they witness a teacher demonstration. Practical means connection with real situation rather than with ideas or theories (Oxford Advanced Learners Dictionary, 2001). Similarly, practical can be defined as knowledge acquired through practical or action rather than theory. Opuh, Eze and Ezemagu (2008), explained practical as a scientific study or an experimental set-up rather than dwelling in the theory and ideas on the introduction to the international senior secondary School certificate examination syllabus. West African Examination council (1998-2003) emphasized the necessity of practicals in learning.

Practical knowledge, according to James (2000), refers to that knowledge which is connected with reality rather than ideas and theories. It is the knowledge acquired through the practical approach to carrying out scientific investigation and teaching. In the words of Mankilik (2011) practical approach means any teaching and learning activity which involves at some point the students (learners) in observing or manipulating real objects and materials. The term practical is used in preference to laboratory work because location is not a salient feature in characterizing this kind of activity. This means that the observation and manipulation of objects could take place in a school laboratory (a specialized defined building equipment with apparatus) or in an out-of school (outdoor laboratory) setting, such

as the learners home (boiling, cooking and freezing of water using mirrors, laundry, making soap to bubble and foam, etc). According to Polman, (2000) teaching without practical are like having a world of men without women, or vice versa. This statement underscores the importance of practical in learning.

According to Science Community Representing Education (SCORE), practical work means “hands-on” learning experience which prompts thinking about the world in which we live (SCORE, 2008:64). Besides, practical work can also be defined as “...learning experience in students interact with materials or with secondary sources of data to observe and understand the natural world” (Lunetta, Hofstein, and Clough, 2007:65). Experimental work and scientific investigations are another ways to be called as practical work (Ramnarain, 2011).

Hands-on methods are suggested in constructivist-based learning (Ng and Nguyen, 2006). Another alternative constructivist learning approach is the use of practical work in science teaching and learning. By having real-life phenomena, students are given the opportunities to evaluate and measure their views and to improve the understandings before the learning process (Ng and Nguyen, 2006). Practical work creates exceptional learning surrounding that help student to construct their knowledge, enhance logical, inquiry and psychomotor skills (Mashita, Norita, and Zurida, 2009). Besides, practical work offers an interactive experience to the students where they can broaden the scope of constructivist learning (Umar, Ubramaniam, and Ukherjee, 2005). The education system in Malaysia and Nigeria is still very exam-oriented which focuses on examination results and marks (Sharifah Fauziah, Farah, Ismin and Izwani, 2012). Malaysian and Nigeria teachers are also unfamiliar to apply constructivism approach in teaching. Therefore, teachers will be more to teacher-centred rather than student-centred and constructivism approach is unachievable (Arlina and

Melor, 2014). In secondary schools, practicals are designed and conducted to engage students individually, or in small groups (student experiments) and in large-group demonstration settings (teacher demonstrations) (Hofstein and Mamlok-Naaman, 2007).

It is believed that by having practical work, students' knowledge can be expanded to understand the real world (Millar, 2004). According to Ozdener's study (as cited in Tüysüz, 2010), it is generally known that students can gain knowledge of personal observation and involvement in practical work. Teaching objectives can be achieved easily by doing practical work especially (El-rabadi, 2013). Furthermore, first-hand knowledge will be generated where students can understand the abstract ideas which are difficult to explain during the class (Osborne, 2002). Students' understanding of theories and models can also be developed (Millar and Abrahams, 2009). According to Inal's study (as cited in Musasia et al., 2012), students are faster to understand the concepts when they test the experiment by themselves as they can touch the materials and apparatus which make them believe in the experiment. According Mwangi, and Kibui (2015) students exposed to practicals performed better than those taught without the practicals. Their results showed that practicals have a significant positive effect on learners' performance in secondary school. This implies that there is a positive linear relationship between practicals and learners' performance in secondary school. Therefore, the use of practicals should be considered when teaching and learning.

Practical work influenced and improved students' academic performances where students can recall what they see and touch rather than what they listen (Adesoji and Olatunbosun, 2008). For weaker students, it is advised to use practical work while teaching as they can perform better compared to other students who taught by lecture method (Odubunmi and Balogun, 1991). Besides, there are studies found that to school where practical work are carry out has a greater effect on their students' academic achievement in science courses

(Sabri and Emuas, 1999). As we know that practical work can create good results in science (Buthelezi, 2012). Moreover, students who did well in the practical work can also excel in final examination (Musasia et al., 2012). The reason is that practical work helps students to remember the apparatus and equipment that have been used and gradually students' manipulative skills can be developed (Sani, 2014). It makes students have a deeper understanding of the subject content (Musasia et al., 2012). If a practical work is well planned and delivered expertly by the teacher, it may give an impact to students in their learning process (Lee, and Sulaiman, 2018).

Opuh, Eze and Ezemagu (2008), observed in line with Addeye that schools which are involved in practical classes perform better in examination than those that neglect practical work'.

Practical work in literature has been referred to in different ways: 'experimental work; scientific investigations (Ramnarain, 2011); 'practical and investigative activities' (SCORE 2008), and 'laboratory investigations' (Kibirige and Tsomago, 2013). The broad perspective of 'learning experiences' will be understood to include the wide range of practical skills, thought and processes that constitute doing science as 'what scientists do' (Benner, 2011).

Some authors in science education and related areas contend that practical work in science has many purposes (Woodley, 2009; Hodson, 1990; Vilaythong, 2011). For instance Watts (2013,) lists some of these purposes to include:

Motivation for students –the excitement of discovery, consolidation of theory, development of manipulative skills, knowledge of standard techniques, general understanding of data handling, development of other skills (e.g. analytic, evaluative, planning, applied,

mathematical) and understanding of how science works: concepts of scientific process, collaborative working, reproducible results, fair testing."

Another purpose for practical work is the understanding of errors and how to design practical procedures in order to improve precision and accuracy. Students acquire skills for safety; risk and precaution against hazards in the laboratory (SCORE, 2008). Practical work also provides learners with evidence to support their understanding and to concretise scientific principles (Jormanainen, 2006). Thus, learners are exposed to basic processes of science through practical work.

Practical work has traditionally been a 'recipe-like' activity that had minimal cognitive engagement and did not inspire originality in students (Bigelow, 2012). Research by The National Research Council (NRC, 2003) and (National Academy of Sciences (NAS), 2010) have recommended that during practical work learners should be investigative, design their own experiments, record and analyze as well as find their own answers. Driver (1983) suggested that instead of learners dealing with already known answers, such as determining known constants, they need to investigate novel problems. In this way practical work supports development of scientific skills, thinking skills and how scientists work. However, other researchers found that the inquiry approach in practical work requires much time and a session of one hour is never enough (Abraham and Millar, 2008). Practical work caters for learning in different ways such as experiential, independent, team and peer dialogue (Zimbardi, Bugarcic, Colthorpe, Good and Lluca, 2013). Different learning styles have the pedagogic benefit of enabling correct concept development. They underscore the empirical nature of science, measurement, repeatability of experiment and learners may enquire as real scientists do. While these pedagogic benefits have yielded encouraging results in science classrooms elsewhere, this has not been the case in South Africa (Buthelezi, 2012, Mji and

Makgato 2006). Onwu and Stoffels (2005) using mixed methods research with 53 practicing teachers in Venda, Limpopo established that most teachers had ‘little experience, meagre training, and operated in large and poorly resourced science classrooms’

Literature is awash with the observation that practical work produces good performance in science (Kerr, 1963; Muwanga-Zake, 2008; Watts, 2009). Despite such observations, Kahle (1999, p2) noted that *Schools are only as good as their teachers, regardless of how high their standards, how up-to-date their technology, or how innovative their programs*. Similarly, low level content, lack of practical skills and negative attitudes towards innovative science teaching are the problems besetting teachers and consequently teachers do not use practical work in their science classes (Onwu and Stoffels, 2005; Lubben et. al., 2010; Kibirige and Tsomago, 2013).

Kulshretta (2013) noted some advantages of practical activities in science to include; skills development, planning, manipulation of equipment, observation, analyzing, evaluating, experiential learning, testing out own ideas, testing out theories, developing of problem solving strategies and team work. Other advantages strategies for effective conduct of practical chemistry works in senior secondary schools by Achimugu (2014) in his study , include- taking responsibility, developing students as self-learners for independent learning, students work at their own pace, at their own level, supporting differentiation by outcome, task and questioning. This enables them to build self- confidence, learning in different ways, working as individuals, manipulating materials and objects, observing the use of all the senses and having informal dialogue with peers and teachers to develop personal, learning and thinking skills (PLTs). These therefore require that science students should be adequately taught through practical activities to acquire useful practical skills in science concepts.

The use of practical manual as ‘hands on’ activity in science learning supports the development of practical skills, help to shape students’ understanding of scientific concepts and phenomena. A good- quality practical manual can engage students, help them to develop important skills, help them to understand the process of scientific investigation, and develop their understanding of concepts. Practical manual provides a range of information on how to carry out investigations in various situations such as a step-by-step explanation of producing alcohol (local gin) from fresh palm wine used as methylated spirit and for anesthetic purposes. It is built on the acquired expertise, knowledge and judgment of users in their respective areas of work that practical. (Etiubon and Udoh 2017).

When practicals are used by the teacher when teaching, these will make the understanding of the concepts clear. Furthermore, practicals are learning tools which help students to concretize concepts and compare the theoretical, practical and real words. These practicals also arouse interest in students. Practical help the teacher and learner to bring the real world into the laboratory and help the learner compare the two and thus have better understanding of the principles (Chiu and Lin, 2002). Students will learn the science concept by doing experiments in the laboratory which is a different approach from “Chalk and Talk” method (Bruner, 1990). Therefore, laboratory experiment is one of the examples of practical work in secondary school level (Musasia et al., 2012).

Laboratory manual is a practical guide for systematically directing students on how laboratory procedures are to be carried out. It gives the guideline for clear explanation and instructions regarding rules and regulation, material, time and space management and students’ commitment to responsibilities. It provides general and specific guidelines for activities frequently performed in science laboratories. According to Nurzatulshima (2008),

laboratory manual provides an authoritative collection of core experimental procedures that engage students' psychomotor activities for wider application of knowledge.

Laboratory has been defined by several authors in different ways. Maduabum (1992) sees a laboratory as a place where scientific exercises are conducted by the science teachers for the benefit of the students (learners). The laboratory exercises include; experiments, and other activities which help the students in acquiring scientific skills. Ezeliora (2001) defined science laboratory as a workshop where science is done or where scientific activities are carried out under conducive environment. She also sees the laboratory as a place where science equipment, materials or instruments are housed for security and safety. Igwe (2003) observed that a laboratory can be in door such as the sufficiently designed and equipped room found in most schools or outdoor involving such places as riverside, workshop, field and even market for carrying out scientific studies. He further stated that whatever the type of laboratory employed in science teaching, the same laboratory experience should be attained, that is a participation in the series of experimental, observational and demonstrating activities which provide opportunity for students to develop understanding of practical and theoretical concepts through solutions of problems. According to Omiko (2007) a laboratory is a room, or building or a special period of time equipped and set apart for practical or experimental studies to take place. He sees the laboratory as the heart of a good scientific programme which allows students in the school to have experience which are consistent with the goals of scientific literacy. This implies that science teaching and learning cannot be completely done in a secondary school where there is no equipped laboratory. Ufondu (2009) observed that the laboratory is an indispensable organ of the school, if effective teaching and learning are to be achieved especially in science and science related subjects.

Hornby (1998) defined laboratory as a room or building used for scientific research, experiments, demonstration, testing and analyzing of data etc. However, whatever is done in the science laboratory is to obtain or acquire skills that would help to advance scientific knowledge which subsequently would lead to the development of the human society. Dienye and Gbamanja (1990) observed that laboratory method of teaching is an activity involving a two-way approach carried out by one or more persons through the exercise and experimental approaches both of which are useful in science teaching. The experimental approach provides an opportunity for students to seek information using experimental procedures. These procedures call for careful observations and interpretation of data. It has the qualities of questioning, investigating and confronting the unknown. Udonfu (2009) and Omiko (2015) observed that the use of the laboratory in teaching has the following benefits:

- (1) Laboratory teaching makes the students/learners to learn about the nature of science and technology in order to foster the knowledge of human enterprise of science and thus enhance the aesthetic and intellectual understanding of the child. Dienye and Gbamanja (1990) in a book science education, theory and practice opined that science is known to be a way of doing certain things by the observation of natural phenomena, quantifying the observed thing, integration of such quantities and interpretation of the results in order to make useful meaning out of the exercise. The students can identify cause and effect relationships and in this process develop important skills.
- (2) Learning scientific inquiry skills that can be transferred to other spheres of problem solving (that is acquisition of problem solving skills). One of the basic goals of science education is to help students learn skills that can be applied to other life situations in future. It thus follows that the exercise of transfer of such learning

condition must have something in common with the situation to which it will be applied.

- (3) Students learning to appreciate and in-fact, emulate the role of the scientist through acquisition of manipulative skills. The students should be allowed to investigate by:
 - (a) Indirect observation of objects and materials for the acquisition of mental as well as manipulative skills, example measuring substances, using weighing balances pictures, cylinder, etc.
 - (b) Through multiple trials, students can in the process of fiddling with materials and activities without stated theories arrive at useful conclusions.
 - (c) Given a known theory, students can be guided to observe some phenomena selected by the teacher and from such observation make predictions that are likely to occur.
- (4) Developing interests, attitudes and values by considering what science entails, it is clear that a field experience has the best potential for stimulating a life time interest in science in the students when accorded the chance for personal experience by handling the real things. Students interest in science increases as they yearn to investigate and explore more about their environment.

According to Hancy in Omiko (2007), eight (8) aspects of scientific attitudes exist all of which can be nurtured in the science laboratory in the school. They are; (i) curiosity (ii) open mindedness (iii) objectivity (iv) intellectual honesty (v) rationality (vi) willingness to suspend judgment (vii) humility (viii) reverence for life. Laboratory instruction is considered essential because it provides training in observation, supplies detailed information, and aroused pupil's interest. Dienye and Gbamanja (1990). They also went further to say that "developing and teaching in an effective laboratory requires as much skill, creativity, and

hard work as proposing and executing a first-rate research project. They also listed the following number of possible goals that can be achieved through a developed laboratory programme: (i) develop intuition and deepen understanding of concepts (ii) apply concept learned in class to new situations (iii) experience basic phenomena (iv) develop experimental and data analysis skills (v) learn to use scientific apparatus (vi) learn to estimate statistical error and recognize systematic errors (vii) develop reporting skills (written and oral).

Omiko (2007), listed five groups of educational objectives that may be achieved through practical instructions.

1. Skills: manipulative skills, inquiry skills, investigative skills, organizational skills and communicative skills.
2. Concept of mastery: For example, hypothesis, theoretical model, taxonomic category.
3. Development of cognitive abilities: Critical thinking, problem solving, application, analysis, synthesis
4. Understanding the nature of science – scientific enterprises, scientists and how they work, existence of a multiplicity of scientific methods, inter-relationships between science and technology and among the various disciplines of science.
5. Development of scientific attitudes: For example, curiosity, interest, risk taking, objectivity, precision, confidence, perseverance, satisfaction, responsibility, consensus, collaboration, and liking science. The major disadvantages of this method are that it is time consuming and expensive to organize.

Yusuf (2003) classified most laboratory approaches to teaching into five distinct groups, namely: (a) verification and deductive; (b) inductive; (c) scientific oriented processes;

(d) technical skills-oriented processes; and (e) exploratory oriented skills. The verification deduction approach endorses laboratory sessions where students are presented with concepts and or conceptual frameworks as well as the procedural instructions which are designed to enable them verify the concepts involved. In inductive learning sessions, students are required to examine, group and label specific bits of information to find patterns; by means of these, they are enjoined to develop a set of working hypotheses regarding prospective concepts they are bound to encounter; this procedure often requires the collection of evidence to verify or refine any hypothesis raised. The scientific oriented processes are constituted into actions; these processes are classified into basic processes and integrated processes (Marceno, 2000; Yusuf, 2003). The basic processes are reflected thus: observing, classifying, communicating, measuring, predicting and inferring; the integrated processes are re-counted as follows: identifying and controlling variables, formulating and testing hypotheses, interpreting data, defining operationally, experimenting, and constructing models. This is related to Dave's 1970 (theory) Psychomotor Domain Taxonomy (PDT), his five levels of skill performance. That is progressing from one stage to the other, from the most basic to the most advanced

Attitude of Secondary School Students Towards Foods and Nutrition Practicals

Foods and Nutrition commonly is a sub set of Home Economics of paramount importance in helping to raise the community's living standards and is thus a vital factor on social and economic development of a nation. From literature reviewed, it observed that Foods and Nutrition education has a critical role to play in the developing countries of the world. Most of these developing countries are apparently still not convinced of the importance of this subject area, and to this Spafford (2000) reported that "the public is largely unconvinced by the importance of this subject." Observations in recent literature as well as in

writings dated as far back as 1930s show that most students fail to select Foods and Nutrition subject because / their parents regard the subject as “inferior and degrading,” and others because it has no immediate vocational value.

However, such an issue has been proved wrong by Spafford (2000) when he observed the following in as far as career aspirations in Foods and Nutrition is concerned:

"Students in Foods and Nutrition should come to know themselves better - their assets and liabilities for employment - as well as the job demands of many different occupations. The field has much to offer in increasing the general employability and job satisfaction of all youths".

Scott (2009) stated that many people within and outside the profession view Foods and Nutrition in schools and colleges as a special subject primarily for young women and a few brave young men. This statement seems to be documented by studies showing that 99.9% of Foods and Nutrition college graduates are women. (McGrath, 2008; Sciiab, 2006). Similarly on another note, many studies have shown that Foods and Nutrition as a course as compared to other courses lack prestige, glamour, and academic respectability. Such a situation can only be improved if administrators and teachers could be helped to see that Foods and Nutrition is more than 'stitching and cooking'.

In another related study by Stinnet, Richson, and Olson (2001), the greatest proportion of respondents namely, 67% felt that Foods and Nutrition is a profession primarily for women. This finding supports Scott's statement that majority still view the subject as a woman's profession. This suggests to the entire public that in publicity efforts and in the classroom, there is a need for greater emphasis on the opportunities available to men and the contributions which they can make to the Foods and Nutrition profession.

Review of Related Empirical Studies

Lee and Sulaiman (2018) in a study titled effectiveness of physics practical work on students' academic performances and to compare male and female students' academic performances after the implementation of practical work in experimental group. A quasi-experimental design was used in this study. This study was conducted in a secondary school at Semporna District in Sabah. The experimental group and control group were taught by using practical work and traditional teaching method respectively. The respondents were purposively selected with a total of sixty-six (66) students chosen for the study. The instrument used was a questionnaire validated by two experts with teaching experience more than five (5) years in physics. For the reliability, The Cronbach's Alpha (α) Coefficient obtained was 0.761. Before the treatment, students in both groups showed no significant difference in their academic performances indicating that the group of students is homogenous. Students' academic performances, however, have a statistical difference after the implementation of practical work. Gender analysis was done where male students in experimental group performed better than female students. This is relevant to the present study because practical teaching method lead to students improved performance in practical subject like Foods and Nutrition. It also compared the performance of students based on gender.

Okam and Zakari (2017) study titled impact of laboratory- based teaching strategy on students' attitude and mastery of chemistry concepts. The quasi experimental and control research design as well as a survey design were used. The population consists of one thousand five hundred and ninety-two (1592) SSII chemistry students in all government-owned schools in Katsina Local Government Area of Katsina State. Two schools were randomly selected and served as experimental and control schools. The study adopted the

pre-test and post-test control group quasi-experimental design. A total number of 194 SSS II students participated in the study. Physics Achievement Test (PAT) was the main instrument used to collect data from students. Test and retest was used for the reliability of the study. The values of the reliability of the two instruments used in the study ("Chemistry Concepts Achievement Test" and "Students' Attitude Questionnaire in Chemistry") are 0.69 and 0.99 respectively. The data collected were analyzed using descriptive statistics and t-test, using SPSS 15.00 statistical packages at 0.05 level of significance. Finding of the study revealed that students taught using laboratory teaching strategy performed better and showed positive attitudes more than the students taught using lecture method. Similarly, there was no significant difference in the mastery of chemistry concept among the male and female students in the experimental group. The finding further revealed that female students within the experimental group demonstrated higher interest than their male counterparts. It was also found that laboratory teaching method was more effective and therefore science teachers should teach students the skills for investigation rather than telling them facts in chemistry. This is relevant to the present study because practical based strategy of teaching would lead to students improved performance in practical subject like Foods and Nutrition.

Etiubon and Udoh (2017) investigated the effects of practical activities and manual on science students' academic performance on solubility in Uruan Local Education Authority of Akwa Ibom State. The study design adopted for the study was non- randomized pretest – posttest experimental design in two intact classes. The study adopted pretest, posttest non randomized quasi experimental design. Three research questions and three hypotheses were formulated to guide the study. One hundred and four (104) science students from the population of two thousand, nine hundred and fifty (2, 950) senior secondary two in 2015/2016 academic session formed the sample size using simple random sampling

technique. Instrument for data collection was a 20- multiple-choice-test item on the concept of solubility. The instrument was validated by three experienced secondary school science teachers of over 10 years teaching experience and by three lecturers from the department of science education and test and measurement unit of the University of Uyo, Uyo. Kuder Richardson formular was used in determining the reliability of the instrument was which 0.80. The research questions were answered using mean and standard deviation while the hypotheses were tested using Analysis of Covariance (ANCOVA). The findings of the study showed that students taught solubility with practical activities performed equally with their counterparts taught the same concept with practical manual. Results also showed that gender had no significant influence on the students' mean performance scores when taught solubility with practical activities and practical manual. It is relevant to this study, because it touches on the importance of practical instruction on student performance.

Saurabh , Jayashree and Prashant (2016) investigated a study titled knowledge and food hygiene practices among food handlers in food establishments. The population is all the food handlers in given area like Suraram, Shapur, Jeedimetla, Gajulramaram, Chintal and Gandimaisamma were contacted. . A cross-sectional survey design was used. A total of 86 questionnaires were administered to food handlers in food establishments and were also interviewed within the stipulated time. The Cronbach alpha statistic was used to test for internal consistency which gave a value of 0.72. Food handlers with poor personal hygiene and lack of awareness of important issues in preventing food borne diseases, working in food establishments could be potential sources of infections of many intestinal helminthes of protozoa and enterogenic pathogens. The objective of the study was to procure information about various food handling practices and spread awareness about the prevention of food borne diseases. Organization based cross-sectional study. All the food handlers in given area

like Suraram, Shapur, Jeedimetla, Gajulramaram, Chintal and Gandimaisamma were contacted. A total of 86 food handlers in food establishments were interviewed within the stipulated time. The required data is obtained by per designed questionnaire method; the data collection involves the following criteria – Food handling practices, environmental and personal hygiene, knowledge of food hygiene and safety and also their attitude, measures taken for controlling and preventing of food borne illnesses, incidence of food borne diseases. Proportions and Chi square test were used for analysis of the data. Results: It was found that maximum food handlers were not certified in food training (82.5%). Only 27.9% of food handlers reported that they heard about food borne diseases. That is they were aware that food can be a source of infection if not handled properly. Awareness or knowledge was better in females (36.8%) compared to males (25.3%). Majority of food handlers acquired their knowledge through mass media. It is seen that overall the attitude of food handlers towards handling of food was satisfactory. In the present study, it was found that all practices related to food hygiene were very well followed by majority of the food handlers in the study. It is important to this study because it enriches the literature of the study on good hygiene, good food safety knowledge and practices.

Nora, Anushree and Amit (2016) investigated a study titled knowledge of food safety and food handling practices amongst food handlers in the Republic of Ireland. A total of 1069 participants from all over the Republic of Ireland contributed to the survey. The study was a survey design and the instrument used in data collection was questionnaire. Content validity was used to validate the instrument by two experts. The Cronbach alpha statistic reliability test was 0.82. Results showed that the residents of Ireland overall had an average level on knowledge of food safety practices (67.0% passing rate). They had an average level of knowledge in food storage (52.8% passing rate), usage and maintenance of the kitchen

facilities (59.0% passing rate), and personal hygiene (61.0% passing rate). Conversely, they had a critically low level of knowledge in food handling (10.8% passing rate) and food poisoning (20.1% passing rate). The results of the present study also showed that, the level of knowledge of food safety practices varies amongst the residents based upon their gender, age, place of residence, education level, and marital status, while no significant difference in the knowledge level was observed based upon their per capita income. The study thus, highlights that there is scope for improvement for the residents to advance their knowledge of food safety practices. It is relevant to the current study because it touches handling practices, although the study was not on students.

Olutola, Daramola and Bamidele (2016) investigated a study titled comparative effects of practical and alternative to practical methods on students' academic performance in Biology in Ilorin, Nigeria. The pretest–posttest quasi quasi experimental design was used. The population of the study consisted of two senior secondary schools (SSS) in Ilorin metropolis randomly chosen and intact science class of SSS 3 in each of the chosen school was selected for the study. A total of sixty-six (66) Form Four students participated in this research; thirty-two (32) students were assigned to experimental group and thirty-four (34) students to control group. The experimental group and control group were taught by using practical work and traditional teaching method respectively. The instrument used was questionnaire. The researchers' designed Biology Practical Test 1 (BPT 1) and Biology Practical Test 2 (BPT 2) with Cronbach's alpha reliability coefficient of 0.73 (Pre-test) and 0.82 (Post-test) were used to obtain data for the study. Data on students' academic performances were analysed by using Statistical Package for Social Science (SPSS) Version 22.0 and Mann-Whitney U Test was used. Findings revealed that there is a significant effect of practical methods on secondary school students' performance in Biology. In addition, there

is no significant effect of gender on students' academic performance in Biology and there is no significant interactive effect of gender subject combinations and practical methods on students' performance in Biology. This is relevant to the present study because practical knowledge would lead to students improved performance in practical subject like Foods and Nutrition.

Agbo, Ahmed, Alhaji and Auta (2016) study titled the level of application of practical activities in learning science concepts in integrated science in the secondary schools in Gombe metropolis, it also find out the problems that militate against the successful application of practical activities in learning science concepts. The study was guided by five research questions and one hypothesis. The study adopted a quasi experimental research design and consists of the control and experimental group in determining the effect of practical activities on students' academic achievement, the control group received no treatment while the experimental group was taught for a period of two weeks employing practical activities. The population of the study comprised all the available Integrated Science teachers and all students in junior secondary schools in Gombe Metropolis while the sample of the study was made up of a total of 80 junior secondary school students from the JSS 2. Also a questionnaire was designed for the teachers, to get their opinion about practical activities in learning science concepts as test was administered to the students to determine the difference in the academic achievement of students taught employing practical activities and those taught with the conventional method. The validity and reliability of the instruments were determined, the content validity was done by three experts in the department of Educational Foundation of the University of Jos, whereas the reliability of the instrument was determined using the Kuder-Richardson K-21 formula and the reliability was found to be 0.81. The SPSS was used for the statistical analysis of Pearson Product moment correlation

coefficient and the study made the following findings, practical activities in learning science concepts increases students achievement in science, spurs their motivation for learning and makes learning more meaningful as theories are concretized. This is relevant to the present study because practical knowledge would lead to students improved performance in practical subject like Foods and Nutrition.

Muriungi (2016) investigated a study titled household's knowledge, attitude and food handling practices, consumption of traditional fermented milk and risk factors for adult overweight and obesity in Isiolo central sub county. y. A cross-sectional survey was carried out among households in an emerging peri-urban town in the Northern part of Kenya in January 2016. A two stage multicluster sampling was used to select 5 Sub-locations and 25 villages from the sampling frame. A pretested semi structured interview questionnaire was used to collect data from 423 households. The questionnaires were standardized based on experiences from the pre-test. The reliability result from test and retest was 0.68. The study found households that did not produce traditional fermented milk scored highly on the knowledge and practices items related to food handling compared to households that produced traditional fermented milk. Further analysis on the socio-demographic characteristics associated with knowledge, attitude and practices on food handling showed significant association between age, gender, residency and the educational status of study adults. This is relevant to the present study because practical instructions on food handling practice improves students knowledge and attitude food safety and it covers food handling practices which is part of the current study.

Mwangi, and Kibui (2015) investigated a study, titled effect of chemistry practicals on students' performance in chemistry in public secondary schools of Machakos and Nairobi counties in Kenya. The research was conducted using quasi experimental of the pre- test –

post test design. Multi-stage cluster sampling and purposive sampling were used to obtain a sample of 735 Form Two students from 24 public secondary schools in Machakos and Nairobi counties for this study. The students' performance in chemistry was determined from scores obtained by students in Students Achievement Tests (SATs) done just before and immediately after exposure to the topic under investigation. The SATs was standardized by experts. The Spearman–Brown prophecy formula. The scale has a reliability coefficient of 0.69. Descriptive and inferential statistics such as the mean and independent t-test were used to discuss the research findings. The study found that there is a positive relationship between the use of chemistry practicals and learners' performance in chemistry. The results of the study indicate that the students had comparable performance in chemistry before treatment; that the performance of the students taught using chemistry practicals improved after the treatment; and that there was a significant difference in performance in the post test between the experimental and control groups. This is relevant to the present study because practical instruction would lead to students improved performance in examinations and also same quasi experimental design was used.

Omiko (2015) in a study titled, laboratory teaching: implication on students' achievement in chemistry in secondary schools in Ebonyi state and Ufondu (2009), the role of the laboratory on the academic achievement of students in biology in Abakaliki education zone of Ebonyi state, were of the same opinion where they observed that laboratory teaching is sometimes used in conjunction with large lecture courses so that students may acquire technical skills and apply concepts and theories presented in the lecture. Omiko (2015) in the study, aimed at investigating the roles of the laboratory in students' academic achievement in chemistry in secondary schools in Ebonyi State of Nigeria. Descriptive survey research design was used. Four research questions and two hypotheses guided the study. The

population of the study consisted of all the chemistry students in the secondary schools in the 212 Government owned secondary schools in Ebonyi State. A sample of 240 students selected through simple random sampling technique from ten secondary schools in the 3 Education Zones in Ebonyi State was used for the study. A questionnaire instrument developed by the researcher was used for data collection. The instrument was validated by three experts one from measurement and evaluation and the other two from chemistry education. Test of reliability was done using Cronbach Alpha-statistic. A reliability coefficient of 0.80 was obtained. The data collected were analyzed using mean and standard deviation statistics. t-test was used in testing the hypotheses. The results showed that the use of the laboratory helps to: develop scientific attitudes in the students towards the learning of chemistry especially practicals, develop scientific skills for problem solving in students among others. He also stated that “hands-on experience encourages students to develop a spirit of inquiry and allows them to acquire scientific skills and the right attitude to handle scientific tools and materials. Science laboratory provides students with the richest experiences which they will transfer to the society and their various places of work. It helps in providing the students the opportunities to practice science as the scientist do. In order for the laboratory to be effective, students need to understand not only how to do the experiment, but why the experiment is worth doing, and what purpose it serves for better understanding of a concept, relation, or process.

Based on the roles of the science laboratory in science teaching and learning, it implies that schools without laboratories would end up producing or graduating students who will have no knowledge of science practicals required by the West African Examination Council (WAEC) and the National Examination Council (NECO) to pass the senior school certificate examination. Consequently, these students will lack the requisite requirement qualification

for courses like medicine, engineering, agricultural science and any of the science related careers. This is relevant to the present study because practical knowledge would lead to students improved performance in food handling practices and development of skill in the subject matter.

Muchai (2012) explored a study titled effects of practical work on students' achievements in Physics at secondary school level in Murang'a East Sub-County. The study used a quasi-experimental pretest-posttest design. The study targeted 9820 students in 31 public secondary schools of Murang'a East Sub-County. A pilot study was undertaken for purposes of validation and testing the reliability of the research instrument that was used. Content and construct validity was used. The reliability of the assessment test was determined using the split-half method. A reliability coefficient of 0.83 and 0.87 were obtained for the Pre-test and posttest tests respectively. It comprised four mixed secondary schools purposely sampled; two experimental groups and two control groups. The main units of analysis were the 188 (sample size) Form 2 students of the four purposively sampled mixed day secondary schools. All the four groups were exposed to the pretest. The experimental groups were taught using the practical approach for one term while the control groups were taught using the traditional method. The study used four instruments namely: A pretest physics achievements test, physics attitudinal scale, an observation checklist and post-test physics achievements test. The study concluded that, practical instructional approach towards physics is an effective teaching method which physics teachers should be encouraged to use to enhance students' achievements in the subject. This is relevant to the present study because practical instruction is equally used in this study. It is equally relevant to the study because it is based on quasi-experimental design but does not deal on skill acquisition.

Mojca, Silvestra, and Peter, (2008) conducted a study titled food safety knowledge and practices among pregnant and non pregnant woman in Slovenia with 291 pregnant women and 200 non-pregnant women found that the women lacked food safety knowledge and safe food handling practices, hand washing practices and hygienic practices in home kitchen. The study used a survey design method. Both interview and questionnaire were used. The Cronbach alpha statistic was used to test for internal consistency which gave a value of 0.69. They consume meals at fast food restaurants. They do not possess adequate knowledge to check best before date, do not pay attention to hygienic conditions in stores and they do not wash their hands before and after cooking and consuming food. They concluded that to achieve global food safety, it is necessary to inform consumers, especially vulnerable groups, about fundamental principles of food safety assurance at home, since food safety begins in the home of the consumers. It important to this study because good food safety knowledge and practices among students will enable them to perform better after school.

Brewer, Sprouls, and Craig (2004) studied consumer attitudes toward food safety issues. The objectives of their study were to survey consumer attitudes about the safety of the food supply in general, then relate general concern levels with groups of specific items of concern, regulatory issues, and prioritization of food safety funding areas. It was a survey design. The instrument used was questionnaire. Factor analysis of 419 consumer responses showed six factors (chemical, health, spoilage, and regulatory issues, deceptive practices, and ideal situations) and the population of the study is 1250. The instrument has a reliability of 0.71. They suggested that while consumers might have relatively high levels of concern about food safety is an issue, they were not overly concerned about the different measures to increase foods safety. This is relevant to the present study by demonstration of different food handling practices, students are aware of different measure to food safety

Knight, Jackson, Bain, and Eldemise–Sheares, (2003) study, titled household food safety awareness of selected urban consumers in Jamaica. The study used a survey design and 110 randomly selected householders representing three distinct socio-economic groups in North Central St Andrew, an urban community in Jamaica, were conducted during January-March 1999. The population of the study is 1050. The objectives of the study were to determine the household awareness of safe food handling, risk perception, food handling practices and attitude to food safety issues. The instrument used was the questionnaire. The reliability value was 0.78. Majority of respondents reported a fairly high knowledge of safe food handling practices; however, more than one-half were unfamiliar with the correct procedure for freezing and thawing of foods. Householders were very concerned about the food they purchased for preparation at home, displayed strong concerns about sanitation of food handling establishments, food handlers' practices, and the appearance of foods purchased. The majority of respondents had never contacted their local Health Department or the Ministry of Health regarding food safety concerns. Diarrhea, stomach pain, vomiting and nausea were reported as the major symptoms of food-borne illness, while animal foods including dairy, beef, chicken, pork and fish/shellfish were implicated as the main source of food borne illnesses. There were no significant differences ($P < 0.5$) observed between gender and socio-economic groups in the study, except for concern of the appearance of food and shopping options, respectively. These findings raise concerns about consumer food safety knowledge and practices in Jamaica. It is relevant to this study because it covers handling practices but did not emphasis on skill practice and development.

Summary of Reviewed Literature

In summary, this chapter reviewed literature related to Foods and Nutrition Practical Demonstration Instructional Method and student's food handling practices. The literature reviewed the concept of Home Economics and Foods and Nutrition. It explained Home Economics as a broad spectrum that comprises various branches of studies of which foods and nutrition is one. In the review, Foods and Nutrition Practical was stressed as the focus of students' food handling practices and Foods and Nutrition curriculum at secondary school level, with emphasis on practical work to enable the students become active participants in order to acquire and develop better skills. The theoretical framework of the study was based on the theory of Dave's Psychomotor Domain Taxonomy of learning which hinges on the five stages of Practical learning, namely: Imitation, Manipulation, Precision, Articulation, and Naturalization.

A number of empirical studies related to secondary school student's food handling practices were reviewed. However, most of the empirical studies reviewed showed that most students do not have appropriate food handling practices (poor hygiene and skill development).

Foods and Nutrition is a science subject in vocational education that requires practical instructions just like other science subjects. The gap in the study is that research on Practical Demonstration Instructional Method has not been carried out in schools in Benin Metropolis especially in Egor and Oredo local government areas of Edo State. Despite the works done by different researchers on handling practices, none to the best of researcher's knowledge had attached importance to Foods and Nutrition Practical Instructional Method of teaching food handling practicals to students in Senior Secondary Schools. Observation from analysis showed that most of the studies on Practical Instructional Method were on science subjects Physics, Chemistry and Biology, none was done on Foods and Nutrition as it relates to

practicals. Therefore this study tried to bridge the gap by proposing the use of Practical Demonstration Instructional Method rather than the conventional teaching Methods during practicals to improve secondary school students' hygiene practices and proper handling of tools and equipment in food preparations (handling practices). Thus, the study tried to provide more information on Foods and Nutrition to teachers and Secondary School Students on the need for Practical Instructional Method for teaching and allowing improvisation where there are lack of equipment and tools to arouse students' interest in practicals where they will appreciate and see their hand works. Where students are allowed to participate in Foods and Nutrition practicals in schools, they will develop more skills and be active in class. This will make students to be regular in practical classes and will also help the male students to feel free beyond gender bias to offer Foods and Nutrition as a subject or career as far as the benefits are concerned.

CHAPTER THREE

METHODOLOGY

This chapter present the method used in this study, under the following sub-headings:

- Design of the Study
- Population of the Study
- Sample and Sampling Technique
- Research Instrument
- Validity of the Instrument
- Reliability of the Instrument
- Treatment Procedure
- Control of Extraneous Variables
- Method of Data Collection
- Method of Data Analysis

Design of the Study

The study used the quasi- experimental non randomized design in which there was pre-test, post test, groups. The design involved two groups; the experimental (treatment) group and control groups (using conventional method) and there were pre-test and post test observation tests for both groups. Quasi- experimental design was used because there was no room for randomization (Ofoegbu, 2011). Therefore, intact classes were used for both (experimental and control) groups to avoid disruption of normal class lessons and other

activities of the school programme. The variables of the study are: Practical Instructional and Conventional Methods (independent variables), food handling practices (dependent variable), gender/sex (intervening variable).

The design for this study is therefore illustrated and represented symbolically as follows:

	Pre-test	Treatment	Post-test
Experimental (Practical Method)	O ₁	X ₁	O ₂
Control (Conventional method)	O ₁	X ₂	O ₂

Where :

O₁ = Pre-test

O₂ = Post-test

X₁ = Treatment -Practical Demonstration Instructional Method

X₂ = Usual treatment (Conventional Method).

Population of the Study

The population of the study consisted of 115 (Edo State Ministry of Education, (2019) SS11 Foods and Nutrition students in public mixed secondary schools in Egor and Oredo local government areas in Benin Metropolis. These two schools were chosen out of the 8

public mixed secondary schools in Benin Metropolis because they have things in common (more male students offering F/N than in other school).

Table 1 shows the population distribution of students offering Foods and Nutrition.

Table 1: Population Distribution of Students Offering Foods and Nutrition

S/N	Name of School	Male	Female	Total
Egor L.G.A				
1	Asoro Grammar School	3	14	17
2	Eweka Grammar School	10	20	30
3	Evbareke Secondary School	2	7	9
4	Uselu Secondary School	2	6	8
5	Uwelu Secondary School	2	8	10
Oredo L.G.A				
6	Akenzua II Secondary School	1	10	11
7	Ihogbe Secondary School	6	12	18
8	Oba Ewuare Secondary School	2	10	12
Total		28	87	115

Source: Edo State Ministry of Education (2019)

Sample and Sampling Technique

The sample size of the study was forty-eight (48) SSII Foods and Nutrition students in two secondary schools that were purposively selected out of the eight (8) co-educational Secondary Schools in Benin Metropolis offering Foods and Nutrition. The two schools were selected from Egor and Oredo LGAs respectively which are Eweka and Ihogbe Secondary

Schools because these two schools have more male students offering Foods and Nutrition. Eweka Secondary School has 30 SSII students offering Foods and Nutrition, that is 10 males and 20 female students. Ihogbe College has 18 SSII students offering Foods and Nutrition with 6 male students and 12 female students. The 18 students in Ihogbe College were used as experimental group and the 30 students from Eweka secondary school were used as control group and both were intact classes.

Table 2: Sample size of the Study

S/N	Name of School	Group	Male	Female	Total
Egor L.G.A					
1	Eweka Grammar School	Control	10	20	30
Oredo L.G.A					
2	Ihogbe Secondary School	Experimental	6	12	18
Total			16	32	48

Research Instrument

The instruments used for data collection were a standardized West African Examination Certificate (WAEC) Practical past question to assess practical works (Appendix 5) and an adapted WAEC and National Business and Technical Examination Board (NABTEB) scale. It contained a 4 point likert scale for 45 observable behavioural items, which assessed students' Psychomotor skills with the following modified likert scale ratings: very good =4, Good=3. Fair =2 and poor =1 (Appendices 3& 4).

Validity of the Instrument

The instrument checklist which was adapted from WAEC and NABTEB for Foods and Nutrition was validated by the supervisors and two experts, one in measurement and evaluation and the other in Foods and Nutrition both in university of Benin. They made some observations and suggestions to increase the number of items from (30 to 45) which were corrected by the researcher to suit the purpose of the study.

Reliability of the Instrument

In establishing the reliability of the instrument that was used for this study, copies of the research instrument were given to the food and nutrition teacher in Asoro Secondary School in Egor LGA, Edo State to assess twenty (20) Foods and Nutrition students who were part of the population but outside the selected sample. Data were collected and analyzed using Cronbach alpha statistics of internal consistency. The result showed r- value of 0.79 which means that there is consistency in the instrument.

Treatment Procedure

The researcher obtained permission from the school authorities in the Secondary Schools concerned for the involvement of the teachers, students and facilities. The researcher briefed the two groups of Foods and Nutrition teachers on the researcher's intended work with the students before the commencement of the treatment for the experimental and control groups. The students in the experimental group were guided by the researcher using Practical Demonstration Instructional Method as they carried out the practical exercise while those in the control group were taught directly by the regular teacher using lecture (conventional) method

Phase 1: Pre-treatment Assessment (First Week): The students' knowledge of handling practices were first observed on both experimental and control groups before

the commencement of the treatment. The pre-treatment assessment instrument is made up of 4 rating scales and 45 items were used to observe psychomotor skills and behaviour of the students during practical classes. The assessment was done on the two groups (Practical Demonstration Instructional (experimental) Method and Conventional (control) Method, with the help of the regular teacher who had been briefed on the procedure to be used within the first week.

Phase 2: Treatment Package: The researcher prepared four weeks lesson notes for the control group using the conventional lecture method and another four weeks lesson notes for the Practical Demonstration Instructional (experimental method group) Method group (Appendices 6 and 7). The lesson notes were used to teach the students for four weeks (weeks 2 – 5) covering the four selected practical topics. The Foods and Nutrition teacher in the control group taught the students using conventional method while the researcher taught the students in the experimental group using Practical Demonstration Instructional Method. The teacher in the control group was briefed and observed during the lesson.

Phase 3: Post-treatment Assessment (The Sixth Week): At the end of the six weeks of treatment, the same assessment instrument was reshuffled for use by the researcher (experimental group) and the regular Foods and Nutrition teacher in the control group for the post test assessment of students' practical. At the end, each group had two sets of scores; pre-test assessment scores and post-test assessment scores.

Control of Extraneous Variables

Extraneous variables are nuisance variables that must be controlled to avoid bias.

For this study, the extraneous variables were:

6. **Time between pretest and post- test:** The time between pre-test and post-test if too long, there could be the influence of forgetfulness. To avoid this influence, the researcher conducted the post-test immediately after the treatment. The short period will help to control the pre-test sensitization.
7. **Teachers' variable:** Teachers' variable may affect the outcome of the research in quasi experimental study. The teachers' variable could occur if the same teacher was made to teach the experimental and control groups, the teacher may notice the differences between the two groups, this may cause one group being at an advantage position than the other.
8. **Experimental bias:** the researcher did not teach the two groups to avoid bias. The conventional method group was taught by the regular Foods and Nutrition teacher in the school under the supervision of the researcher while the experimental group was taught by the researcher.
9. **Students' interaction:** Using students in one school for both experimental and control groups could cause students sensitization as their interaction could be that they are being used for research purpose. The study therefore, chose two intact classes from two different schools.
10. **Duration of teaching:** For the purpose of this study, the duration was six weeks and the normal periods of the lesson per week was used that is double periods of 45 minutes each per week. The first (week 1) and last (week 6) weeks were used for Pre-test assessment and Post-test assessment respectively while the remaining four weeks (weeks 2-5). To control this variable therefore, both groups were taught within the same length of time. If

one group was taught for a longer period, the students will have advantage over the second group in terms of skills and knowledge that could be gained.

Method of Data Collection

The data collection were through checklist (rating) scale assessment sheets which were given to the control group teacher and the others for the experimental group were used by the researcher before and after commencement of the treatment.

Method of Data Analysis

Data were analysed using frequency distribution and percentage for research questions 1 and 2, with decision rule on students score of below 50%, is regarded as low hygiene knowledge; 50-69% taken as moderate hygiene knowledge, while 70% and above was taken as high hygiene knowledge. Paired sample t-test was used to test hypothesis 1 testing at 0.05 alpha level of significance. When the p-value was less than the alpha value of 0.05, the null hypothesis was rejected, otherwise accepted when p-value was higher or equal to 0.05.

Hypotheses 2 and 3 were tested with t-test of independent sample and tested at 0.05 level of significance. Where p-value was less than the alpha value of 0.05, the null hypothesis was rejected, otherwise accepted, where p-value was higher or equal to 0.05.

Hypothesis 4, was tested with two way ANCOVA and tested at 0.05 level of significance. Where p-value was less than the alpha value of 0.05, the null hypothesis was rejected, otherwise accepted where p-value was higher or equal to 0.05.

CHAPTER FOUR

PRESENTATION OF RESULTS AND DISCUSSION OF FINDINGS

The focus in this chapter was the presentation of results based on the data collected and analysed, as well as the discussion of findings

Presentation of Result

The data analysed are presented in the following tables based on research questions and hypotheses:

Research Question1: What is the level of knowledge on hygiene of food handling practices of students before Foods and Nutrition Practical Demonstration Instructional Method?

Table 3: Level of knowledge of hygiene on food handling practices

Level of Hygiene knowledge	N	%
Low	29	60.4
Moderate	15	31.3
High	4	8.3
Total	48	100

N = 48

Table 3 shows that out of 48 participants observed in Foods and Nutrition practical class, 29 of them had low level of hygiene knowledge in food handling practices before Foods and Nutrition Practical Instructional Method. This accounts for 60.4%.of participants that scored below 50%, 15 participants which accounted for 31.3% of the total students scored between 50 and 69 which is moderate level of hygiene knowledge in food handling practices and 4 out

of the total participants which accounted for 8.3% of the students scored 70% and above which is high level of hygiene knowledge in food handling practices.

Research Question 2: What is the level of knowledge on hygiene of food handling practices among male and female students?

Table 4: Level of knowledge of food handling practices among male and female students

Level of Hygiene	No of Female	%	No of Male	%
knowledge				
Low	18	56.25	11	68.75
Moderate	11	34.38	4	25
High	3	9.38	1	6.25
Total	32	100	16	100

N = 48

Table 4 showed that they were 32 females and 16 males were observed in food handling practices before the introduction of Practical Demonstration Instructional Method. It was observed that 18 females and 11 males which accounted for 56% and 68.75% out of the total of 32 females and 16 males scored below 50% which means low level of hygiene knowledge. 11 females and 4 males which accounted for 34.38% and 25% respectively scored between 50 and 69% meaning moderate level of hygiene knowledge in food handling practices. 3 females and 1 males which accounted for 9.38% and 6.25% of students, meaning those who scored 70% and above with high level of hygiene knowledge. Therefore, those with high level of hygiene knowledge are very few while those with low level of hygiene are more with few moderate level of hygiene knowledge.

Hypothesis 1: There is no significant difference between the pre-test and post-test mean scores of students taught food handling practice with practical instructional method

N = 18

Tables 5: Paired sample t-test of experimental group in food handling practices

Test	Mean	Std deviation	t-value	Sig	Decision
				2 tailed	
Pretest	66.69	11.73			
			-5.954	0.000	rejected
Posttest	84.02	7.42			
$\alpha=0.05$					

Table 5 showed the paired sampled t-test of the experimental group in food handling practices at pre-test and post-test. The table showed a t-value of -5.954 and a p-value of 0.000, testing at an alpha level of 0.05, the p-value is less than the alpha level. So the null hypothesis which states that “there is no significant difference in the pre-test and post-test mean scores in students food handling practices before and after students were exposed to Foods and Nutrition Practical Instructional Method” is rejected. Therefore, there is a significant difference in the pre-test and post-test mean scores of students food handling practices before and after students were exposed to Foods and Nutrition Practical Instructional Method. Since the mean score of post-test is higher than the mean score of pre-test, it shows that the practical instruction is effective.

Hypothesis 2: There is no significant difference between the post- test mean scores of the experimental and control groups on food handling practices.

Table 6: t-test of independent samples on students' food handling practices at pre- test

Group	N	Mean	Std deviation	t-value	Sig	Decision
					2 tailed	
experimental	18	66.69	11.73			
				9.238	0.000	Rejected
control	30	45.61	3.51			
$\alpha=0.05$						

Table 6 showed the t-test of independent sample on students' food handling practices of both the experimental and control groups at pre-test. The table showed a t-value of 9.238 and a p-value of 0.000, testing at 0.05 alpha level of significance. The p-value is less than the alpha level. So there is a significant difference at pre-test between the experimental and control groups. So the null hypothesis, which says that “ there is no significant difference between the post-test mean scores on food handling practices of the experimental and control groups is rejected. Hence, the need for Analysis of Covariance (ANCOVA) at post-test; with pre-test as covariate.

Table 7: Mean and standard deviation of students' food handling practices treatment at post-test.

Group	No of students	Mean ($\bar{x}$)	Std deviation
Experimental	18	84.02	7.42
Control	30	63.14	3.03

Table 7 showed descriptive statistics of mean and standard deviation of student's food handling practice treatment scores at post-test of both experimental and control groups. The table showed a mean of 84.02 and a standard deviation of 7.42 for the experimental group at post test and a mean of 63.14 and standard deviation of 3.03 for the control group at post test.

Table 8: One way ANCOVA of students food handling practices at post-test.

Source	Type III sum of square	Df	Mean Square	F-stat	Sig	Decision
Corrected model	5027.999 ³	2	2513.999	104.571	0.000	
Intercept	3194.056	1	3194.056	132.859	0.000	
Pretest	120.676	1	120.676	5.020	0.030	
Group	1062.946	1	1062.946	44.214	0.000	rejected
Error	1081.845	45	24.041			
Total	247864.890	48				
Corrected total	6109.843	47				

$\alpha=0.05$

Table 8 showed One-way analysis of covariance (ANCOVA) of students' food handling practices treatment scores at post-test of experimental and control groups. The table showed *F-statistic value* of 44.214 and a *p-value* of 0.000 testing at an alpha level of 0.05. The *p* –

value is less than the alpha level of 0.05. Thus, the null hypothesis which states that “there is no significant difference between the post test scores of the experimental and control groups in students’ food handling practices” was rejected. Therefore, there is a significant difference in the post test scores of the experimental and control groups in students’ food handling practices. Since the mean of the experimental group was greater than that of the control group, it means that treatment was more effective with experimental group than the control group.

Hypothesis 3: There is no significant difference between the post-test mean scores of male and female students in the experimental group on food handling practices.

Table 9: t-test of independent sample on students food handling practices of post-test by gender

Sex	No of students	Mean	Std deviation	t-value	Sig 2 tailed	Decision
Male	6	79.48	7.18			
				-1.987	0.064	Retained
Female	12	86.29	6.70			

$\alpha=0.05$

Table 9 showed a t-test of independent sample of students’ food handling practices of the experimental group by gender at post test. The table showed a t-value of -1.987 and a p-value of 0.064, tested at an alpha level of 0.05. The p-value is greater than the alpha level of 0.05. This showed that there was no significant difference in the posttest scores of the male and females students in food handling practices, thus, the null hypothesis which stated there is no significant difference in the post-test scores in students’ food handling practices of male and

female students in the experimental group is retained. Meaning that the Foods and Nutrition Practical demonstration instructional method is effective for both sexes.

Hypothesis 4: There is no significant interaction effect between treatment method and male and female on students' food handling practices

Table 10: showed a mean and standard deviation of male and female students handling practices at post - test

Group	Gender	Mean	Std deviation	N
experimental	male	79.48	7.18	6
	female	86.29	6.70	12
Control,	male	59.39	1.30	10
	female	65.01	1.45	20

$\alpha=0.05$

Table 10 showed a mean and standard deviation of the male and female students in the experimental and control groups. A breakdown of the result showed that under the experimental group, the males had a mean of 79.48 and standard deviation of 7.18, while the females had a mean of 86.29 and standard deviation of 6.70 at post-test. The mean score of male was less than that of the female but with a slightly higher standard deviation than the female. Under the control group, the males had a mean of 59.39 and standard deviation of 1.30, while the females had a mean of 65.01 and standard deviation of 1.45 at post-test. The female had higher mean and standard deviation value than the male. The table showed that the male and female in the experimental group out scored their counterpart in the control

group. To determine if there was an interaction between treatment and gender on food handling practices scores based on group and gender, ANCOVA statistic was used to test hypothesis four as shown on table eleven

Table 11: Two-way ANCOVA of treatment by gender interaction effect on students food handling practices

Source	Type III sum of square	Df	Mean($\bar{x}$) square	f-stat	Sig	decision
Corrected model	5314.650	4	1328.662	71.847	0.000	
Intercept	3463.557	1	3463.557	187.292	0.000	
Pretest	11.351	1	11.351	.641	0.438	
Group	1261.061	1	1261.061	68.192	0.000	
Sex	280.992	1	280.992	15.195	0.000	
Group Sex	3.117	1	3.117	.169	0.683	retained
Error	795.193	43	18.493			
Total	247864.890	48				
Corrected total	6109.843	47				
$\alpha=0.05$						

Table 11 showed the interaction effect between treatment and gender on food handling practices scores of students. The table showed F-value of 0.169 and p-value of 0.683; tested at an alpha level of 0.05. From the table, p-value was greater than the alpha level, so the null hypothesis which stated that there is no significant interaction effect of treatment by gender on students' food handling practices is retained. This means that the treatment was effective irrespective of the gender of the students.

Discussion of Findings

The study examined the effect of Foods and Nutrition Practical Instructional Method on students food handling practice of in secondary schools in Benin metropolis, Edo state, Nigeria. The findings revealed that out of the 48 SS11 Foods and Nutrition students observed in practical class before being exposed to Foods and Nutrition Practical Instructional Method, 19 (39.58%) of the participants had little hygiene knowledge. This was an indication that students generally have poor food handling practices which had been identified as leading cause of majority of the foodborne diseases, because they did not place importance on hand washing when handling foods. This may be due to lack awareness. Nigusse and Kumie (2012) supported the findings and pointed out that food handlers with poor personal hygiene and lack of awareness of important issues in preventing food borne disease and working in food establishment could be potential source of infections of many intestinal helminthes of protozoa and enterogenic pathogens. On the contrary, Williams (2001) is not in support of this findings because he remarked that mishandling and disregard for food hygiene measures on the part of the food handlers may result in food contamination and its consequences such as food poisoning and other food related diseases(typhoid and cholera). Thus, he remarked that proper food handling and preparation is an important aspect of nutrition and community health that require attention. Result also revealed that 5 out of 16 male students and 14 out of the 32 female students in the study had little knowledge of hygiene in food handling practices before being exposed to Foods and Nutrition practical instructions. This accounts for 31.25% and 43.75% of male and female students respectively who had hygiene knowledge before being exposed to Foods and Nutrition Practical Instructional Method. It is obvious that there is a gender gap in Foods and Nutrition as a subject hence, there are a variety of theories as to

why male students lose interest in Foods and Nutrition, such as parental influence, blame on the teachers and societal influence (Williams 2001). Although many parents, educationists and the society are taking great strides to create equity in all areas of life especially in areas of education and work force for male and female. This finding is in-line with Miller, (2004) as to why boys may want courses that are more task oriented than girls. In this findings also, the percentage of female is higher than that of the male students because more female students use to offer Foods and Nutrition as a subject and most of these female students were with their mothers or most of the time with their mothers in the kitchen.

The curious and observable one will want to do everything as their mothers do, such as washing hands and equipment before use in the kitchen. The females learnt these habits from home because they were always in the kitchen with their mothers. This is in-line with Okorie and Ezeji (2008) who stated that some parents are not guiding their male children well to develop interest in the study of Foods and Nutrition. Hence, Okoh (2006) observed that girls are more involved than male in home domestic work or activities; so there is every good evidence that female students will have good hygiene than male students. However, APU (2008) is not in support of this, instead emphasized that parents should guide and educate male children on the importance of foods and nutrition in societal building. These male students should be encouraged to offer Foods and Nutrition as a subject.

Result revealed that there was a significant difference in the pre-test and post-test scores in food handling practices before and after students were exposed to foods and nutrition practical instructions. This finding is in agreement with Mankilik (2011) who stated that practical approach means any teaching and learning activity which involves at some point the students (Learner) observing or manipulating real objects and materials. Polma (2000) remarked that teaching without practicals will not enhance active learning and

participation. This statement shows the importance of practical in learning. The findings is also in line with the work of El-rabadi (2013) who said that the teaching objectives can be achieved easily by doing practical work. The study of Lee and Suliaman (2018) showed that there was a significant difference in the effectiveness of Physics practical on academic performances, after implementation of practical work which is in-line with this finding.

Also, the result revealed that there was a difference in the post-test scores of experimental and control groups in food handling practices. It means that Foods and Nutrition practical instruction is effective in teaching handling practices. The finding is in line with Okam and Zakari (2017) in their study on impact of laboratory based teaching strategy on students attitude and mastery of Chemistry concepts. The study revealed that students taught using laboratory teaching strategy performed better and also that laboratory teaching method is more effective. It is clear that Foods and Nutrition practical instruments on handling practices is more effective in enhancing students handling practices and preferred to lecture /conventional teaching method. Also, Mwangi and Kibui (2015) supported this study's findings by observing that students exposed to practical method perform better than those taught with conventional method. This goes to show that there is a positive relationship between practical and learners' handling practices because of the opportunity of touching and manipulating materials and apparatus which is applicable to Foods and Nutrition instructions method. Also, Adesoji and Olatunbosun (2008) supported the findings of this study as they found that practical work influences and improves students handling performance as they can easily recall what they see and touch rather than just listening. On the contrary, the findings of their study was not supported by Kahle (1992), who noted that schools are only as good as their teachers, regardless of how high their standard, or up-to-date their technology or innovative their programmes are. Students still look up to their teachers before they could carry out any practical.

The result from the study also revealed that there is no significant difference between male and female students' scores of the experimental groups in food handling practices. This implies that both male and female students equally benefitted from the use of practical instructions. This shows that the method is not sex biased. This shows that male can also favorably compete in a profession traditionally dominated by females. This is supported by Etibon and Udoh (2017) who showed that gender has no significant influence on student performance taught solubility with practical activities. It means that both the male and female students perform well in Foods and Nutrition practical using practical instruction method. This is not in agreement with findings of Stinnet, Richson and Oloson (2001), and Scott (2009) in their studies where they observed that, Foods and Nutrition is still viewed as a female profession. Similarly, Lee and Sulaiman (2018) found that gender has no influence on students' Physics practical work. Also in support of this study is Okam and Zakari (2017) in their study on impact of laboratory based teaching strategy on students' attitude and mastery of Chemistry concepts. To them, gender has no influence rather they found that there was no significant difference in the mastery of Chemistry concepts among the male and female students in the experimental group.

Result from this study revealed that there is no significant treatment by sex interaction effect on student's food handling practice. This means that the treatment is effective irrespective of the sex of students. This is in-line with Etiubon and Udoh (2017) who found that gender has no significant influence on the students' mean performance scores when taught solubility with practical activities. However, this study disagrees with findings of Okam and Zakari (2017) in their study, where they revealed that female students within the experimental group demonstrated higher interest than the male counterpart. It shows that there was a significant treatment by sex interaction effect on students' food handling

practices. This result is supported by Olutola, Daramola and Bamidele (2016) who reported that there is no significant effect of gender on students academic performance in Biology and there is no significant interactive effect of gender based on subject combinations and practical method on students performance in Biology. Also the study found that sex has no significant interaction effect on treatment in teaching and Nutrition. This study is also supported by Knight, Jackson, Bain and Eldemise-Sheares(2003 Foods) who found that no significant difference was observed in gender and socio-economic group in the study of household food and safety awareness of selected urban consumers in Jamaica.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents the summary, conclusion and recommendation of the study based on the findings.

Summary

The study examined the effect of Foods and Nutrition practical demonstration instructional methods on students' food handling practices in secondary schools in Benin metropolis, Edo state, Nigeria. Six research questions were raised and four hypotheses formulated and tested at alpha level of 0.05. The design adopted for the study was quasi - experimental non randomized intact class group design. The sample size for the study consisted of forty eight (48) SSII Foods and Nutrition students in two senior secondary schools sampled from eight (8) mixed secondary schools in Benin metropolis.

The instruments used for data collection were Foods and Nutrition West African Examination Council (WAEC) past practical paper I question and a checklist which was adapted from WAEC and National Business and Technical Education Board (NABTEB) Foods and Nutrition. The duration for the study was six (6) weeks. The researcher taught the experimental group with foods and nutrition practical demonstration instructional method while the regular Foods and Nutrition teacher taught the control group using lecture method. The researchers lesson notes were used using the same topic while the control group teacher was briefed on how to carry out the teaching. The students were observed on food handling practices using checklist for both experimental and control groups to collect data before the commencement of the treatment (pre-test scores). At the end of the treatment, a post-test and delayed observation on handling practices (reshuffled) for both experimental and control

group were done and data were collected (post test scores). Using the data collected, the research questions were answered with percentages while the hypotheses were analysed and tested using paired sample t-test, t-test of independent sample and Analysis of Covariance (ANCOVA). All hypotheses were tested at 0.05 alpha level of significance. The findings of the study include;

- Out of the 48 SSII Foods and Nutrition students observed on food handling practices during practical before treatment (Foods and Nutrition Practical Instructional Method) 39.58% of the participants had little knowledge of hygiene in food handling practices.
- There was a gender difference in the level of knowledge on hygiene as male students scores lower (31.25%) than the female scores (43.75%), although they both had little knowledge.
- There was no significant interaction effect by gender on treatment of students on food handling practices.
- The Foods and Nutrition Practical Instruction Method was effective for the experimental group.

Conclusion

Based on the findings of this study, the conclusion was drawn that the students have little knowledge of hygiene, the female students are better on the level of knowledge on hygiene than the male students, the Foods and Nutrition Practical Instructional method helped students to acquire better knowledge in hygiene and food handling practices. This is based on the facts that the method would make foods and nutrition teachers to adequately plan and prepare lessons that would guarantee learning by students because they will be involved and

be active in class. Also, the Practical Instructional Method was very effective on the experimental group than those taught with conventional method. Finally, the treatment was effective irrespective of the gender of students.

Recommendations

The following recommendations' were made based on the findings of this study

7. Foods and Nutrition practical Instructional method, has the potential of positively influencing Foods and Nutrition students food handling practice, therefore it is recommended that Foods and Nutrition teachers should engage in the use practical oriented instruction methods like the Practical Instructional Method. This could be done by revealing practical in struction during seminars and workshops.
8. There should be provision facilities for practical lessons in foods and nutrition for more practicals.
9. The method has the tendency of increasing students handling practices proficiency. It is recommended that students should be properly trained to acquire the skills in handling practices and be encouraged to apply it.
10. Foods and Nutrition should also be encouraged in single sex schools (boys especially)
11. There should be regular cooking competitions in-order to increase students' proficiency in handling practices.
12. Policy makers should make Foods and Nutrition compulsory in all public secondary schools in the Federation.

Curriculum planners should include F/N in the senior secondary school, grouping among

the compulsory subjects in school.

Inspectorate division should make it a mandate to be sending their representatives to schools to monitor the use of equipment provided to schools by the teacher and students.

Contribution to Knowledge

The findings of this study have contributed to knowledge in the following ways:

- (5) The study has established that Practical Instructional method has helped students to improve on food handling practices irrespective of gender.
- (6) The study has helped to provide empirical data on students' food handling practices in secondary schools in Edo State.
- (7) The study has established that Practical Instructional Method is an effective method for teaching Food and Nutrition Practicals in Secondary Schools in Edo State.
- (8) The study showed that Practical Instructional Method has made students to better their hygiene practices during Food and Nutrition Practicals in Secondary Schools in Edo State.

Suggestions for Further Studies

Based on the scope and findings of the study, it was further suggested that:

- Similar study using Practical Instructional Methods should be carried out in other local government areas in Edo state and possibly other states in Nigeria.
- A study on the evaluation of the teaching facilities used in the teaching and learning of Foods and Nutrition in secondary schools in Edo state be carried out.
- A study on the effect of teachers' qualification on the teaching and learning of Foods and Nutrition in secondary schools in Edo state be embarked upon.

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Appendix 1

**Table 1: Population Distribution of Students Offering Foods and Nutrition in 2019/2020
Academic Session.**

S/N	Name of School	Male	Female	Total
Egor L.G.A				
1	Asoro Grammar School	3	14	17
2	Eweka Grammar School	10	20	30
3	Evbareke Secondary School	2	7	9
4	Uselu Secondary School	2	6	8
5	Uwelu Secondary School	2	8	10
Oredo L.G.A				
6	Akenzua II Secondary School	1	10	11
7	Ihogbe Secondary School	6	12	18
8	Oba Ewuare Secondary School	2	10	12
Total		28	87	115

Source: Edo State Ministry of Education (2019)

Appendix 2

Letter of Identification

UNIVERSITY OF BENIN, BENIN CITY, NIGERIA

DEPARTMENT OF VOCATIONAL & TECHNICAL EDUCATION

FACULTY OF EDUCATION

OFFICE OF THE HEAD OF DEPARTMENT



Our Ref:

Your Ref:

P.M.B. 1154,
Cables & Telegrams: Uniben Benin
Talex: 41365 Uniben NG.
Telephone: (052) 600553, 600556, 600546
600566
Extensions:
E-mail: vte@uniben.edu.ng

18th September, 2018

TO WHOM IT MAY CONCERN

LETTER OF IDENTIFICATION

This is to certify that the bearer GLORIA IFE YINWA BARDI, is a Ph.D student in the department of vocational and Technical Education, Faculty of Education, University of Benin.

She is carrying out a study on the topic *“EFFECT OF FOODS AND NUTRITION PRACTICAL INSTRUCTIONS ON STUDENTS' FOOD HANDLING PRACTICES IN SENIOR SECONDARY SCHOOLS IN BENIN METROPOLIS, EDO STATE, NIGERIA”*

I wish to request your kind permission to enable her carry out the study/research .

Thanks for your cooperation.

Yours sincerely,


DR. (MRS.) H. A. OLUMESE
Head of Department



Appendix 3

Modified checklist

Please tick the appropriately.

Gender: Male () Female ()

Key: Excellent ==4, Good=3. Fair =2 and poor =1

s/n	Skills/Tasks to be rated in the practical work	4	3	2	1
1	Personal appearance before commencement of work				
2	Choice of equipment and tools to be used				
3	Cleanliness of equipment and tools to be used				
4	Arrangement of equipment and tools before commencement of work				
5	Display of equipment and tools according to functions				
6	Display of ingredients				
7	Availability of measuring instruments				
8	Use of measuring instrument				
9	Correct use of measuring instruments				
10	Measured items arranged according to usage				
11	Materials /quantities of ingredients for each dish				
13	Preparation of the different courses				

14	Preparation according to service				
s/n	Skills/Tasks to be rated in the practical work	4	3	2	1
15	Usage of seasons/flavors to suit what is being prepared				
16	Dishes chosen according to courses				
17	Cleaning of hands at work				
18	Correct use of chopping boards				
19	Number of chopping boards to suit purposes				
20	Reasons for choice of dishes				
21	Checking oneself and timing				
22	Use of correct pots, sauce pans ,etc				
23	Interpretation of choice				
24	Cleanliness and economy				
25	Dovetailing (Ability to do 2 or 3 task with the same period)				
26	Adequate timing				
27	Ability to finish cooking as planned				
28	Ability to prepare cold foods first				
29	Ability to complete cooking within the stated time				

30	Cleaning and clearing				
31	Appearance after practicals				
s/n	Skills/Tasks to be rated in the practical work	4	3	2	1
32	Laying of table				
33	Folding of napkins				
34	Welcoming of teacher/examiner to the table				
35	Introduction of student				
36	Table arrangement and decoration				
37	Presentation of menu cards				
38	Presentation of water and spoon in a clean glass for tasting prepared foods				
39	Presentation of different courses				
40	Suitable snacks and drinks				
41	Speed of service with correct methodology and presentation				
42	Examiner's comments and corrections				
43	Ability to reorganize the table after assessment				
44	Clear the table course by course				
45	Clear and clean up within the given time				

Appendix 4

Observational checklist

[illegible]

APPENDIX 5

WAEC QUESTIONS

KNOWLEDGE OF FOOD AND NUTRITION PRACTICALS

SC 7023
WASSCE SC 2017
FOODS AND
NUTRITION 3
Practical
1 hour + 3 hours

3

Name:

Index Number:

THE WEST AFRICAN EXAMINATIONS COUNCIL

West African Senior School Certificate Examination for School Candidates, 2017

FOODS AND NUTRITION 3

Preparation Time: 1 hour

Practical Examination: 3 hours

SC 2017

PRACTICAL

Instructions to Candidates and Preparation Sheets

1. The test for all candidates is given on the next page.
2. Read the test carefully.
3. During the next 1 hour you must complete this form using the carbon paper provided and so making two copies. When completed, carefully tear out the carbon copy for your own use during the practical examination and hand it with the original to the Examiner.
4. In Section A, give the:
 - (a) dishes chosen;
 - (b) reasons for your choice;
 - (c) quantity of ingredients used for each dish.
5. In Section B, give the total quantity of all ingredients required.
6. In Section C, give a time-plan showing the order of work; do not write out methods.
7. The blank Pages 3 and 4 may be used for rough work.
8. There will be a preparation period of 1 hour before the test begins. In the 3-hour practical examination, you must complete the cooking, serving and washing-up. You will be expected to keep to your time plan.

10074

© 2017 The West African Examinations Council

Practical :double periods of 45 minutes each

THE WEST AFRICAN EXAMINATION COUNCIL

The West African Senior School Certificate Examination

FOOD AND NUTRITION 1

Preparation Time: 30 minutes

Practical Test: 90 minutes

PRACTICAL 1

Instructions to the students and preparation sheets

3. The test for the students is given on the next page.
4. Read the test carefully
- 3 In section A, give the :
 - a. the dish chosen;
 - b. reasons for your choice;
 - c. quantities of ingredients used for each dish;
2. In section B, give the total quantities of all ingredients required
3. In section C, give a time plan showing order of work; do not write out the methods.
4. There will be preparatory period of 30 minutes before the test begins. In the 90 minutes practical , you will be expected to keep to your time plan

Follow the instruction on the previous page for each week of the practical

Practical Questions

(1) Week 1&2 $\implies$ Using creaming and rubbing – in methods, prepare and serve suitable dishes for two covers.

Wk3 $\implies$ Prepare and serve a suitable one pot dish for a visitor from Lagos .

Wk4 $\implies$ In this festive period prepare a two course meal for two guests using chicken and vegetables with an accompaniment.

Name of Student..... Sex:.....

Section A

Dish chosen	Reasons for choice	Chief ingredients/quantities	Materials/tools

Name of Student..... Sex:.....

Section B

Total quantities of all ingredients

Quantity	Dry stores		Quantity	Fresh foods

Name of Student..... Sex:.....

Section C

Time Plan

Time	Order of work

Appendix. 6

Scheme of work for both experimental and control groups

Foods and Nutrition Practical Scheme of Work

Week	Topic	Objective
1	Method of cake making Creaming method	Students should be able to use bake any cake products using creaming method
2	Rubbing in method	Students should be able to use rubbing in method to produce cake product
3	A-one pot dish	Students should be explain and produce a one pot dish
4	Entertainment of guest	Students should be able to use different meals for festivity

Appendix 7

LESSON PLAN FOR CONVENTIONAL METHOD (CONTROL GROUP) Lesson

Week 1

Name of School: Eweka Secondary School, Benin Technical College Road, Benin City

Topic: Method of Cake making – using creaming method

Class: SSII F&N

Duration: double periods of 45 minutes each

Instructional Objectives: At the end of the lesson period, the students should be able to:

- identify the different tools used for making cake
- measure ingredient correctly
- handle the different tools
- cream cake mixture properly
- bake the cake

Entry Behaviour: Students have eating flour products

Instructional Procedure

Step	Content	Teacher's activity	Students activity
1	Preamble	Divide the class into groups of six	Students stand in groups
2	Assemble tools and equipment	The teacher presents all tools and items needed for the practical	Students touch and pass tools round
3	Personal hygiene	Teacher washes her hand and make sure the students do same and clean all tools and equipment	Students clean the hands and equipment
4	Measuring and sieving the dry ingredients	The teacher demonstrates weighing and sieving of dry ingredients	Students watch with keen interest and attention
5	Creaming method	The teacher demonstrates all the process in creaming method	Students watch and ask questions
6	Greasing of pan and baking	The teacher demonstrates and shows the students how to cream and baking.	Students join in greasing of pans
7	Presentation and serving	The teacher presents the baked products and demonstrates how	Students take a taste of the product

		to serve	
8	Evaluation	Teacher ask some questions	Students give answers to question
	Assignment	Teacher ask students to find out other methods of making cake	

Appendix 8

LESSON PLAN FOR CONVENTIONAL METHOD (CONTROL GROUP) Lesson Week 2

Name of School: Eweka Secondary School, Benin Technical College Road, Benin City

Topic: Rubbing – in method of Cake making

Class: SSII F&N

Duration: double periods of 45 minutes each

Instructional Objectives: At the end of the lesson period, the Students should be able to:

- sieve dry ingredients together
- use their finger tips to rub–in the mixtures
- demonstrate the processes
- prepare some products by rubbing–in method

Entry Behaviour: Students have known how to bake by creaming method

Instructional Procedure

Step	Content	Teacher's activity	Students activity
1	Revision of the previous topic	Teacher asks different groups questions on the previous practical	Students provide answers to questions
2	Measuring and Weighing ingredient	Using measuring tools to measure and weigh ingredients	Students join in weighing and measuring
3	Rubbing – in method	The teacher cleans her hands and tools and demonstrates the processes involved	Students watch with keen interest
4	Creating pastry	The teacher mould the mixture into pastry and make out biscuits or chin-chin, teacher bakes the biscuits or fries the chin-chin	Students watch with keen interest students join in frying
5	Washing and cleaning up	Teacher gather the students to wash and clean	Students participates in cleaning up

		up	
6	Serving of the product	Teacher teaches students how to serve the product (chin-chin and biscuits)	Students taste from the products
	Evaluation	Teacher ask students to describe how to make biscuit by rubbing – in method	Students give answers to questions
	Assignment	Ask students to find out the different methods of cooking	

Appendix 9

LESSON PLAN FOR CONVENTIONAL METHOD (CONTROL GROUP) Lesson Week 3

Name of School: Eweka Secondary School, Benin Technical College Road, Benin City

Topic: Preparing a one pot dish

Class: SSII F&N

Duration: double periods of 45 minutes each

Instructional Objectives: At the end of the lesson period, the students should be able to:

- make use of cutting boards and knives
- prepare beef jollof rice
- set table for the meal
- clear and wash up.

Entry Behaviour: Most of the students have been cooking or assisting their mothers cook at home

Instructional Procedure

Step	Content	Teacher's activity	Students activity
1	Revision	Teacher asks the students questions on previous practical	Students give answers to questions
2	Introduction	The teacher introduces practical for the day and assembles the different food stuffs	Student listen with keen interest
3	Preparation of a one pot dish	The teacher weighs and measure all that are needed, clean and prepare the ingredients for the meals	Students watch with keen interest and join in cleaning
4	Preparation of a one pot dish	Demonstrates and prepare the jollof rice using beef	Students help in plucking, cutting and watching
5	Preparation of a one pot dish	Set table and serve the dish	Students watch and ask questions
6	Preparation of a one pot dish	Shares the food for the students to taste	Students taste the products

7	Evaluation	Ask students reasonable questions on the processes	Students give answers to these questions
	Assignment	Ask the students to find out how to prepare fried rice	

Appendix 10

LESSON PLAN FOR CONVENTIONAL TEACHING METHOD (CONTROL GROUP) Lesson Week 4

Name of School: Eweka Secondary School, Benin Technical College Road, Benin City

Topic: Entertainment of guest (chicken, vegetable, fried rice)

Class: SSII F&N

Duration: double periods of 45 minutes each

Instructional Objectives: At the end of the lesson period, the Students should be able to:

- cut chicken in portions
- use two different chopping boards in cutting chicken and the vegetables
- use the correct sauce pans for frying the chicken and vegetables
- serve food with the accompaniment

Entry Behaviour: The students have been eating different party foods

Instructional Procedure

Step	Content	Teacher's activity	Students activity
	introduction	Display the different food stuff	Students in groups watch with keen interest
2	Introduction of the day's practical	Tell the students the meal to be prepared and necessary ingredients needed	Student pay attention
3	Preparation of the ingredients	Teacher presents all vegetables needed for fried rice	Students watch and ask questions
4	Cleaning of ingredients and washing hands	Teacher asks students to wash their hands and shows students how to wash the vegetable to avoid losing the necessary B and C vitamins (water soluble)	Students wash their hands and help in cleaning the ingredients and watch the teacher demonstrates
5	Preparation	Teacher washes and prepare the chicken, demonstrates cutting of the vegetables	Students watch with keen interest and ask questions
6	Preparation	Teacher prepares the fried	Students answer questions

		rice step b step and asking students questions	and watch the preparation procedures
7	Setting table and presentation of meal	Teacher demonstrates ten formal table setting and present meals	Students watch the formal way of setting table and present of meal
8	Evaluation	Teacher asks the students to mention the ingredients for fried rice	Students answer the questions
	Assignment	Teacher asks the students to clear, clean and wash up	The students clear, clean, wash up and show the teacher

Appendix 11

LESSON PLAN FOR EXPERIMENTAL TEACHING METHOD -WEEK 1

Name of School: Ihogbe College, Benin City

Topic: Cake mixture – Creaming method

Class: SSII F&N

Duration: double periods of 45 minutes each

Instructional Objectives: At the end of the practical lesson, the Students should be able to:

- identify tools to be used
- measure ingredients
- handle tools properly
- operate the cooker

Entry Behaviour: The students have been eating flour products and are familiar with creating new recipe.

Instructional Procedure

The students are shared into groups of four (4)

Instructional Procedure Guideline:

Steps	content	Teacher's activity	Students activity
1	introduction	The teacher briefs students on how to go about their practical and makes sure that they are in different groups..	Students organize themselves in groups with a leader in each group and gather their tools and materials
2	Presentation of the new recipe	The teacher/ researcher inquires about the new recipe	The group leader of each group, presents their menu cards and recipes
3	Preparation of the new menu using developed recipe	The teacher/ researcher moves round to watch assist where necessary	Students together with their group leaders, perform the different tasks in creaming cake mixtures and new recipes. Each student participates in exercise, using their hands and tools.
4	Preparation of the oven or improvisation	The teacher moves closer in case of any mal handling	Students prepare their oven to the desired temperature
5	Baking of the new	The teacher makes sure that the students do not	The students put their mixture in greased pan and put in oven to

	products	burn their products by reminding them to check out what they have in the oven	bake. They occasionally check the oven.
6	Clearing and washing up	The teacher watch the students work in groups	The students clears and wash up all that was used.
7	Presentation of products with their names	Teacher moves round check and access each group's product	The students set tables and present their works.
8	Assignment		The group leaders tells every member of the group what to bring next.

Appendix 12

LESSON PLAN FOR EXPERIMENTAL TEACHING METHOD -WEEK 2

Name of School: Ihogbe College, Benin City

Topic: Cake mixture – Rubbing - in method

Class: SSII F&N

Duration: double periods of 45 minutes each

Instructional Objectives: At the end of the practical lesson, the Students should be able to:

- measure and sieve ingredient together
- use finger tips to rob-in mixtures
- demonstrate the process involved
- prepare product from robbing-in mixture

Entry behaviour: Students have created recipes for creaming method

Instructional Procedure

The students are shared into groups

Instructional Procedure:

steps	content	Teacher's activity	Students activity

1	Preparation of materials and ingredients	Ask students to prepare their material and start work.	Group leaders organizer their students, measure necessary ingredients and sieve dry ingredients together in a bowl.
2	Robbing-in mixture	Teacher moves round to watch and check each group.	With clean hands, the students rob in the mixtures together with their finger tips.
3	Process of robbing in mixture	Ask students questions as they work	Students introduce the new recipes into the mixture and making up the pasteries
4	Preparation of robbing-in mixture	Teacher moves round the different groups to check how the new recipe is been introduced into the mixture.	From the new pastery, the students design what so ever product they want to make.
5	Baking or frying of the product	Teacher watch and assist where necessary	The students fry or bake their products using the correct tools.
6	Setting tables and	Teacher moves round to	Cleaning and

	presentation of products	check and assess students products	washing up, setting the table and serving the robbed-in product.
7	Assignment	Teacher tells students to practice at home.	Students to practice more at home.

Appendix 13

LESSON PLAN FOR EXPERIMENTAL TEACHING METHOD -WEEK 3

Name of School: Ihogbe College, Benin City

Topic: Preparing a one pot dish

Class: SSII F&N

Duration: double periods of 45 minutes each

Instructional Objectives: At the end of the practical period, the students should be able to:

- identify the ingredients for preparing one pot dish
- make use of chopping boards where necessary
- prepare a one pot dish
- set table for the meal
- clear and clean up

Entry behaviour: students are familiar with cooking of different dishes.

Instructional Procedure

steps	Content	Teacher's activity	Students activity
1	Assembling tools and equipment needed	Teacher ask the students to assemble all they need on their tables	Students gather , wash all tools and equipment needed for

			the practical.
2	Preparation	Ask the students to start preparation	Students in their different groups start the preparation by washing, cutting and preparing all ingredients needed
3	Preparation of one pot dish	Goes round to ask questions about what is been prepared	Students in their different groups prepare one pot dish using some food stuff in their locality.
4	Preparation of one pot dish	Teacher watches the different groups to make sure that every one take parts preparation	The group leader assign duty to members of the group.
5	Presentation of one pot dish	Teacher ask any group ready to present their dishes	Cleaning and washing up, setting table and presenting one pot dish
6	Assignment	Ask the students to	Clean and clear the

		clean and clear the environment	environment

Appendix 14

LESSON PLAN FOR EXPERIMENTAL TEACHING METHOD -WEEK 4

Name of School: Ihogbe College, Benin City

Topic: Entertainment with festival food

Class: SSII F&N

Duration: double periods of 45 minutes each

Instructional Objectives: At the end of the practical period, the Students should be able to:

- cut meats into portions
- use two different chopping boards for meats and vegetables
- use correct pots and sauce pans
- prepare any festival food common in their locality
- set tables and serve the meal with any accompaniment

Entry behaviour: Some of the students have been eaten different festive foods while others have ideas of what foods to serve during the festivity.

Instructional Procedure

steps	content	Teacher's activity	Students activity
1	Assemble all tools, equipment and foods required.	Ask students to assemble all materials and tools needed on their tables	Students in their different groups present materials and tools needed

2	preparation	Ask the students to start preparation	Students in different groups start preparation
3	preparation	Moves round to watch students work in their different groups	Students clean, watch, portion meats and wash the different vegetables and prepare all ingredients required.
4	Preparation of festive foods	Moves round to watch and know the names of meals being prepared.	Students in their different groups prepare the different meals for the festivity
5	presentation of the festive food	Assessment of the meals	Students set table tables and present the different festive meals.
6	Assignment	Ask students to clean and wash up tools and material used	clean and wash up tools and material used.

At the end of the fourth week in both control and experimental groups the post test assessment comes up a week after to conclude the field work.

Appendix 15

The test of reliability

Case Processing Summary

		N	%
Cases	Valid	20	100.0
	Excluded ^a	0	.0
	Total	20	100.0

a. Listwise deletion based on all

variables in the procedure.

Reliability Statistics

Cronbach's	
Alpha	N of Items
.793	45

Appendix 16

Data Collected for Pre and Post-Tests

Control Group (Eweka Secondary School)				Experimental Group (Ihogbe College)			
S/N	Sex	Pre-test	Post-test	S/N	Sex	Pre-test	Post-test
1	M	43.8	60.6	1	M	53.9	71
2		36	57	2		62.8	85
3		42.8	60.6	3		62.8	92
4		43	60.6	4		81	82
5		42	58.9	5		37	78.9
6		40.6	60.6	6		75	78
7		42	60	7	F	81.7	82.7
8		42	58.9	8		88.9	91
9		41.7	57.8	9		75	83.9
10		42.8	58.9	10		67	86
11	F	49	62.8	11		70.6	81.7
12		48.9	65.6	12		63	85
13		49	65	13		65	70.6
14		49	63.9	14		63.9	91
15		46.7	64	15		58.9	85
16		49	66.7	16		59	93
17		45.6	67.8	17		72	96.7
18		46.7	66.7	18		63	88.9
19		45	65				

20		44	65				
21		45.6	66				
22		46	62				
23		46	65				
24		52.8	63				
25		46.7	65				
26		46.7	64				
27		47	65				
28		49	65				
29		48.9	66.7				
30		50	66				

Appendix 17

Frequencies

[DataSet1] C:\Users\USER\Documents\Bardi PhD Data Analysis.sav

Statistics

Hygiene practices

N	Valid	48
	Missing	0

Hygiene practices

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 36	1	2.1	2.1	2.1
37	1	2.1	2.1	4.2
40.6	1	2.1	2.1	6.2
41.7	1	2.1	2.1	8.3
42	3	6.2	6.2	14.6
42.8	2	4.2	4.2	18.8

43	1	2.1	2.1	20.8
43.8	1	2.1	2.1	22.9
44	1	2.1	2.1	25.0
45	1	2.1	2.1	27.1
45.6	2	4.2	4.2	31.2
46	2	4.2	4.2	35.4
46.7	4	8.3	8.3	43.8
47	1	2.1	2.1	45.8
48.9	2	4.2	4.2	50.0
49	5	10.4	10.4	60.4
50	1	2.1	2.1	62.5
52.8	1	2.1	2.1	64.6
53.9	1	2.1	2.1	66.7
58.9	1	2.1	2.1	68.8
59	1	2.1	2.1	70.8

62.8	2	4.2	4.2	75.0
63	2	4.2	4.2	79.2
63.9	1	2.1	2.1	81.2
65	1	2.1	2.1	83.3
67	1	2.1	2.1	85.4
70.6	1	2.1	2.1	87.5
72	1	2.1	2.1	89.6
75	2	4.2	4.2	93.8
81	1	2.1	2.1	95.8
81.7	1	2.1	2.1	97.9
88.9	1	2.1	2.1	100.0
Total	48	100.0	100.0	

Frequencies

[DataSet1] C:\Users\USER\Documents\Bardi PhD Data Analysis.sav

Statistics

Hygiene practices

Male	N	Valid	16
		Missing	0
Female	N	Valid	32
		Missing	0

Hygiene practices

Sex			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid	36	1	6.2	6.2	6.2
		37	1	6.2	6.2	12.5
		40.6	1	6.2	6.2	18.8
		41.7	1	6.2	6.2	25.0
		42	3	18.8	18.8	43.8

		42.8	2	12.5	12.5	56.2
		43	1	6.2	6.2	62.5
		43.8	1	6.2	6.2	68.8
		53.9	1	6.2	6.2	75.0
		62.8	2	12.5	12.5	87.5
		75	1	6.2	6.2	93.8
		81	1	6.2	6.2	100.0
		Total	16	100.0	100.0	
Female	Valid	44	1	3.1	3.1	3.1
		45	1	3.1	3.1	6.2
		45.6	2	6.2	6.2	12.5
		46	2	6.2	6.2	18.8
		46.7	4	12.5	12.5	31.2
		47	1	3.1	3.1	34.4
		48.9	2	6.2	6.2	40.6
		49	5	15.6	15.6	56.2

50	1	3.1	3.1	59.4
52.8	1	3.1	3.1	62.5
58.9	1	3.1	3.1	65.6
59	1	3.1	3.1	68.8
63	2	6.2	6.2	75.0
63.9	1	3.1	3.1	78.1
65	1	3.1	3.1	81.2
67	1	3.1	3.1	84.4
70.6	1	3.1	3.1	87.5
72	1	3.1	3.1	90.6
75	1	3.1	3.1	93.8
81.7	1	3.1	3.1	96.9
88.9	1	3.1	3.1	100.0
Total	32	100.0	100.0	

T-Test

[DataSet1] C:\Users\USER\Documents\Bardi PhD Data Analysis.sav

Group = Experimental

Paired Samples Statistics^a

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Pretest	66.6944	18	11.72752	2.76420
Posttest	84.0222	18	7.42354	1.74974

a. Group = Experimental

Paired Samples Correlations^a

	N	Correlation	Sig.
Pair 1 Pretest & Posttest	18	.231	.357

a. Group = Experimental

Paired Samples Test^a

	Paired Differences	T	df	Sig. (2-tailed)

	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Pretest - Posttest	- 1.732 78E1	12.3471 3	2.91025	- 23.46786	- 11.18770	- 5.954	17	.000

a. Group =

Experimental

Group = Control

Paired Samples Statistics^a

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Pretest	45.6100	30	3.51228	.64125
Posttest	63.1367	30	3.02672	.55260

a. Group = Control

Paired Samples Correlations^a

	N	Correlation	Sig.
Pair 1 Pretest & Posttest	30	.742	.000

a. Group = Control

Paired Samples Test^a

	Paired Differences	t	df	Sig. (2-tailed)

	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1: Pretest - Posttest	-1.75267E1	2.39208	.43673	-18.41988	-16.63345	-40.131	29	.000

a. Group =

Control

T-Test

[DataSet1] C:\Users\USER\Documents\Bardi PhD Data Analysis.sav

Group Statistics

Group	N	Mean	Std. Deviation	Std. Error Mean

Pretest	Experimental	18	66.6944	11.72752	2.76420
	Control	30	45.6100	3.51228	.64125

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Pret Equal est variances assumed	15.749	.000	9.238	46	.000	21.08444	2.28240	16.49021	25.67868
Equal variances not assumed			7.430	18.847	.000	21.08444	2.83761	15.14200	27.02689

Univariate Analysis of Variance

[DataSet1] C:\Users\USER\Documents\Bardi PhD Data Analysis.sav

Between-Subjects Factors

	Value Label	N
Group 1	Experimental	18
2	Control	30

Descriptive Statistics

Dependent Variable: Posttest

Group	Mean	Std. Deviation	N
Experimental	84.0222	7.42354	18
Control	63.1367	3.02672	30
Total	70.9688	11.40161	48

Tests of Between-Subjects Effects

Dependent Variable: Posttest

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5027.999 ^a	2	2513.999	104.571	.000
Intercept	3194.056	1	3194.056	132.859	.000
Pretest	120.676	1	120.676	5.020	.030
Group	1062.946	1	1062.946	44.214	.000
Error	1081.845	45	24.041		
Total	247864.890	48			
Corrected Total	6109.843	47			

a. R Squared = .823 (Adjusted R Squared = .815)

Estimated Marginal Means

Group

Estimates

Dependent Variable: Posttest

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	81.234 ^a	1.698	77.814	84.655
Control	64.810 ^a	1.166	62.462	67.157

a. Covariates appearing in the model are evaluated at the following values: Pretest = 53.5167.

Pairwise Comparisons

Dependent

Variable:Posttest

(I) Group (J) Group	Mean Difference (I-J)	Std. Error	Sig. ^a	95% Confidence Interval for Difference ^a	
				Lower Bound	Upper Bound
Experimental 1 Control	16.425*	2.470	.000	11.450	21.400
Control 1 Experimental	-16.425*	2.470	.000	-21.400	-11.450

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Univariate Tests

Dependent Variable:Posttest

	Sum of Squares	df	Mean Square	F	Sig.
Contrast	1062.946	1	1062.946	44.214	.000
Error	1081.845	45	24.041		

The F tests the effect of Group. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

T-Test

[DataSet1] C:\Users\USER\Documents\Bardi PhD Data Analysis.sav

Group = Experimental

Group Statistics^a

Sex		N	Mean	Std. Deviation	Std. Error Mean
Pretest	Male	6	62.0833	15.63233	6.38187
	Female	12	69.0000	9.16951	2.64701

a. Group = Experimental

Independent Samples Test^a

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2- tailed)	Mean Differen ce	Std. Error Differen ce	95% Confidence Interval of the Difference	
								Lower	Upper
Pret Equal est variances assumed	1.230	.284	- 1.194	16	.250	- 6.91667	5.79160	- 19.1943	5.36098
Equal variances not assumed			- 1.001	6.777	.351	- 6.91667	6.90905	- 23.3635	9.53017

a. Group =

Experimental

T-Test

[DataSet1] C:\Users\USER\Documents\Bardi PhD Data Analysis.sav

Group = Experimental

Group Statistics^a

Sex		N	Mean	Std. Deviation	Std. Error Mean
Posttest	Male	6	79.4833	7.17786	2.93035
	Female	12	86.2917	6.70027	1.93420

a. Group = Experimental

Independent Samples Test^a

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2- tailed)	Mean Differen ce	Std. Error Differen ce	95% Confidence Interval of the Difference	
								Lower	Upper
Postt Equal est variances assumed	.005	.946	- 1.987	16	.064	- 6.80833	3.42655	- 14.0722 8	.45562

Equal									
variances not			-	9.487	.083	-	3.51114	14.6893	1.07265
assumed		1.939			6.80833			2	

a. Group =

Experimental

Univariate Analysis of Variance

[DataSet1] C:\Users\USER\Documents\Bardi PhD Data Analysis.sav

Between-Subjects Factors

		Value Label	N
Group	1	Experimental	18
	2	Control	30
Sex	1	Male	16
	2	Female	32

Descriptive Statistics

Dependent Variable: Posttest

Group	Sex	Mean	Std. Deviation	N

Experimental	Male	79.4833	7.17786	6
	Female	86.2917	6.70027	12
	Total	84.0222	7.42354	18
Control	Male	59.3900	1.29910	10
	Female	65.0100	1.44946	20
	Total	63.1367	3.02672	30
Total	Male	66.9250	10.91430	16
	Female	72.9906	11.26022	32
	Total	70.9688	11.40161	48

Tests of Between-Subjects Effects

Dependent Variable: Posttest

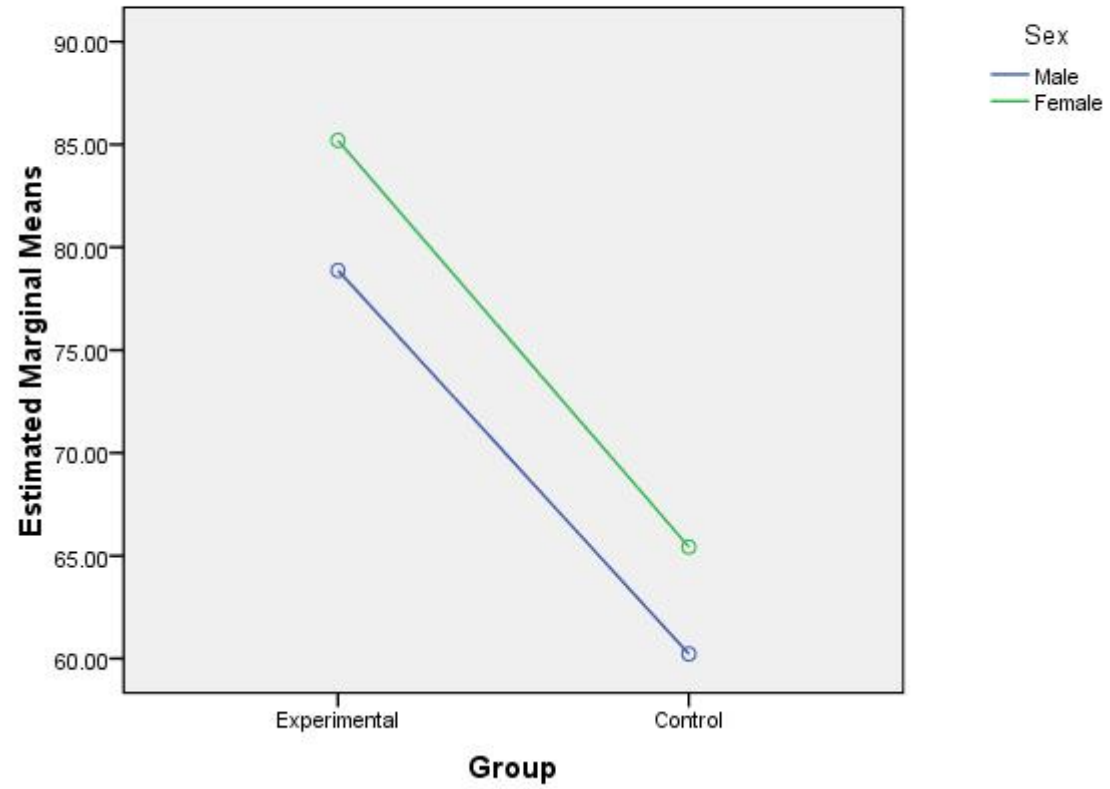
Source	Type III Sum of Squares	df	Mean Square	F	Sig.

Corrected Model	5314.650 ^a	4	1328.662	71.847	.000
Intercept	3463.557	1	3463.557	187.292	.000
Pretest	11.351	1	11.351	.614	.438
Group	1261.061	1	1261.061	68.192	.000
Sex	280.992	1	280.992	15.195	.000
Group * Sex	3.117	1	3.117	.169	.683
Error	795.193	43	18.493		
Total	247864.890	48			
Corrected Total	6109.843	47			

a. R Squared = .870 (Adjusted R Squared = .858)

Profile Plots

Estimated Marginal Means of Posttest



Benin

art

23/12/19

311113331133111111

1200p, 3440x: 21.7ms, 1.0ms, 5.0ms

PRE-TEST ENRICA SAILOR, SECONDARY SCHOOL, EAGLE

2017

LINE	DESCRIPTION	AMOUNT	DATE	INITIALS	REMARKS
1	Balance forward	100.00			
2	John Doe	50.00	1/15/20		
3	John Doe	50.00	1/15/20		
4	John Doe	50.00	1/15/20		
5	John Doe	50.00	1/15/20		
6	John Doe	50.00	1/15/20		
7	John Doe	50.00	1/15/20		
8	John Doe	50.00	1/15/20		
9	John Doe	50.00	1/15/20		
10	John Doe	50.00	1/15/20		
11	John Doe	50.00	1/15/20		
12	John Doe	50.00	1/15/20		
13	John Doe	50.00	1/15/20		
14	John Doe	50.00	1/15/20		
15	John Doe	50.00	1/15/20		
16	John Doe	50.00	1/15/20		
17	John Doe	50.00	1/15/20		
18	John Doe	50.00	1/15/20		
19	John Doe	50.00	1/15/20		
20	John Doe	50.00	1/15/20		
21	John Doe	50.00	1/15/20		
22	John Doe	50.00	1/15/20		
23	John Doe	50.00	1/15/20		
24	John Doe	50.00	1/15/20		
25	John Doe	50.00	1/15/20		
26	John Doe	50.00	1/15/20		
27	John Doe	50.00	1/15/20		
28	John Doe	50.00	1/15/20		
29	John Doe	50.00	1/15/20		
30	John Doe	50.00	1/15/20		
31	John Doe	50.00	1/15/20		
32	John Doe	50.00	1/15/20		
33	John Doe	50.00	1/15/20		
34	John Doe	50.00	1/15/20		
35	John Doe	50.00	1/15/20		
36	John Doe	50.00	1/15/20		
37	John Doe	50.00	1/15/20		
38	John Doe	50.00	1/15/20		
39	John Doe	50.00	1/15/20		
40	John Doe	50.00	1/15/20		
41	John Doe	50.00	1/15/20		
42	John Doe	50.00	1/15/20		
43	John Doe	50.00	1/15/20		
44	John Doe	50.00	1/15/20		
45	John Doe	50.00	1/15/20		
46	John Doe	50.00	1/15/20		
47	John Doe	50.00	1/15/20		
48	John Doe	50.00	1/15/20		
49	John Doe	50.00	1/15/20		
50	John Doe	50.00	1/15/20		
51	John Doe	50.00	1/15/20		
52	John Doe	50.00	1/15/20		
53	John Doe	50.00	1/15/20		
54	John Doe	50.00	1/15/20		
55	John Doe	50.00	1/15/20		
56	John Doe	50.00	1/15/20		
57	John Doe	50.00	1/15/20		
58	John Doe	50.00	1/15/20		
59	John Doe	50.00	1/15/20		
60	John Doe	50.00	1/15/20		
61	John Doe	50.00	1/15/20		
62	John Doe	50.00	1/15/20		
63	John Doe	50.00	1/15/20		
64	John Doe	50.00	1/15/20		
65	John Doe	50.00	1/15/20		
66	John Doe	50.00	1/15/20		
67	John Doe	50.00	1/15/20		
68	John Doe	50.00	1/15/20		
69	John Doe	50.00	1/15/20		
70	John Doe	50.00	1/15/20		
71	John Doe	50.00	1/15/20		

POST TEST ENCELA SENIOR SECONDARY SCHOOL, EGOR LG, RICHY

375

Appendix 18

Chart Showing Internal Temperatures of Cooked Food

Product	Minimum Internal Temperature and Rest Time
Beef, Pork, Veal and Lamb Steaks, Chops, Roasts	62.8°C and allow to rest for at least 3 minutes.
Ground Meats	70°C
Ground Poultry	74°C
Ham, fresh or smoked (uncooked)	63°C and allow to rest for at least 3 minutes.
Fully Cooked Ham (to reheat)	Reheat cooked hams package in USDA inspected plants to 60°C and all others to 74°C.

Product	Minimum Internal Temperature and Rest Time
All Poultry (breast, Whole Bird, Leg, Thighs, Wings, Grounds Poultry, Giblet and Stuffing)	74°C.
Eggs	71°C
Fish and Shell fish	63°C
Left overs	74°C
Casseroles	74°C

Practical Instructional Package (Experimental Group)



Students in groups during practical demonstration class with researcher



Students practicalizing handling practices



A Male Student producing flour product without assistant



The Researcher inspecting students products after handling practices



The researcher corrects the hygienic practices of a student



The researcher talks about the arrangement of the products after handling practices



Students during perfecting handling practices



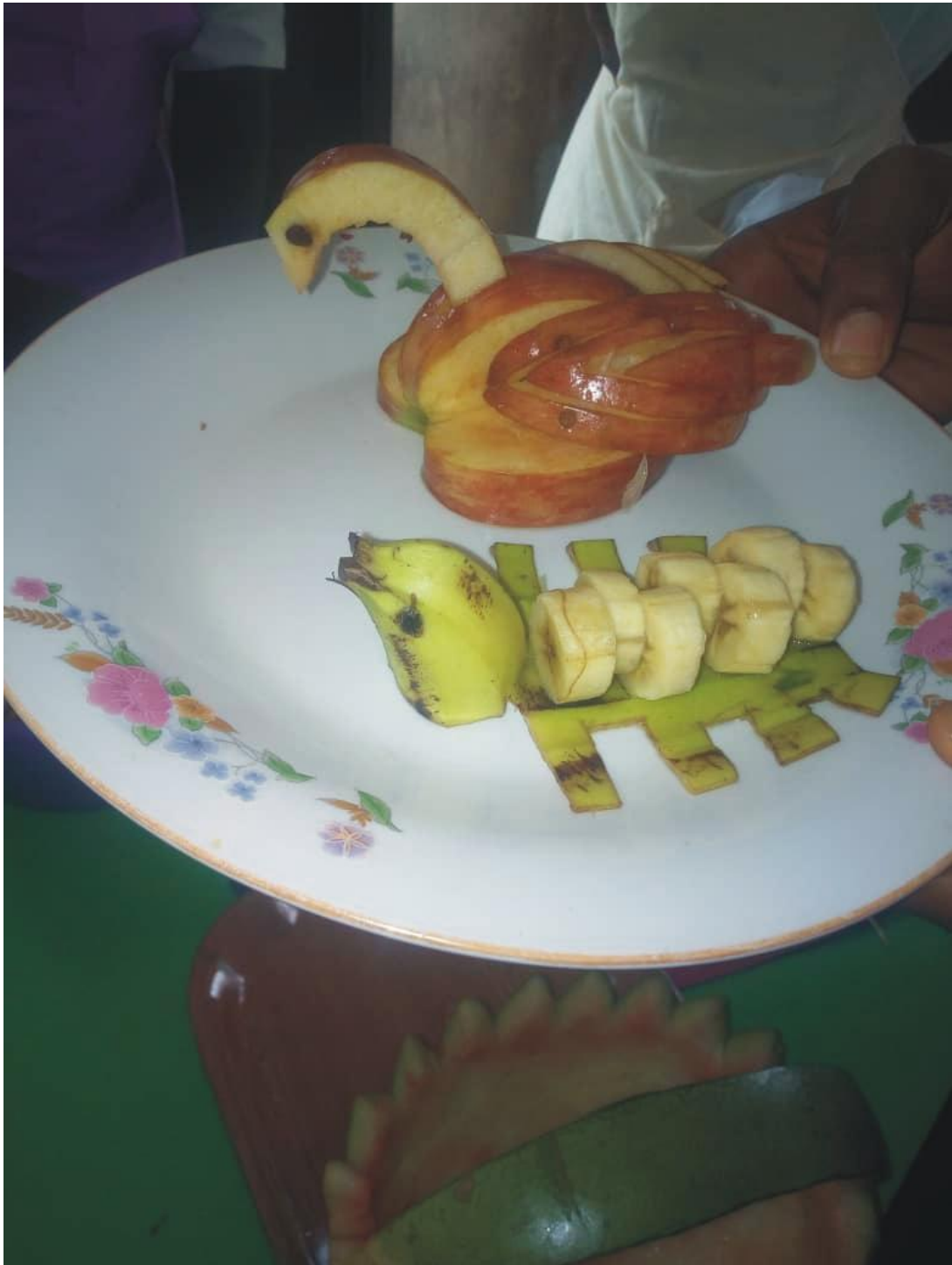
Demonstrating perfection of handling practices



Students display the end product of skills in handling practices



Students develop more skills in handling practices



Skill development by the Students in handling practices



Skill development by the Students in handling practices



The use of apple in developing Skills in handling practices



The end product of students handling practices

